

EVALUATION OF SURGICAL TREATMENT FOR GLAUCOMA WITH SPECIAL REFERENCE TO TRABECULECTOMY

THESIS
FOR
MASTER OF SURGERY
(OPHTHALMOLOGY)



BUNDELKHAND UNIVERSITY,
JHANSI



1984

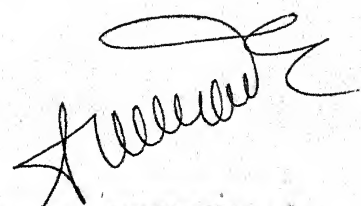
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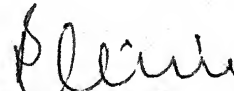
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Certified that the work entitled "EVALUATION OF SURGICAL TREATMENT FOR GLAUCOMA WITH SPECIAL REFERENCE TO TRABECULECTOMY" was conducted by Dr. Sri Ram Soni under our direct guidance and supervision. The investigations, techniques and statistics mentioned in the thesis were actually undertaken by candidate himself. His observations have been checked by us regularly.



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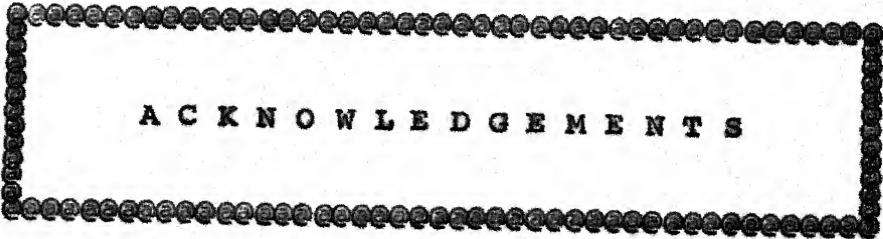


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ACKNOWLEDGEMENTS

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When it comes to express the heart-felt gratitude towards those who were life and soul to this work, my situation is aptly summed up by the lines 'when the heart is full, the tongue is silent'. Words - if they could be adequately used - would perhaps still not suffice in bringing forth the totality of my gratefulness for those concerned. Nevertheless, I will certainly not spare this fortunate opportunity of conveying my feelings in all their humbleness.

The immense and generous help, compounded by the expert guidance and constant encouragement, extended by Dr. B.S. Jain, M.S., Lecturer in Ophthalmology, M.L.B. Medical College, Jhansi, has imbibed in me an unflagging zeal for this work. His ready accessibility, even at his personal inconvenience, and heartening words provided the self-confidence so vital for undertaking such a project. This study carries the glittering imprints of his dynamic personality, wise and concrete suggestions and meticulous attention to detail.

A feeling of sincere gratefulness overwhelms me when I consider my revered and benevolent teacher Professor A.N. Mehrotra, M.S., Head of the Department of Ophthalmology, M.L.B. Medical College, Jhansi, under whose masterly guidance, fatherly attitude and lively temperament, I had an opportunity to work. I find myself lacking when it comes to choosing adequate words to express myself.

For Dr. G.D. Gupta, M.S., D.O.M.S., Reader in Ophthalmology, I have the deepest respect and a sense of perpetual indebtedness. He was a source of unlimited help and profound knowledge - without freely banking upon which it would have been impossible to complete this awesome task. His discerning criticism, seasoned rationale and affectionate nature were a constant beacon of moral support to me.

I must express my sincere thanks to Dr. V. Misuria, M.S., Lecturer in Ophthalmology, for his continuous interest and helpful suggestions from time to time.

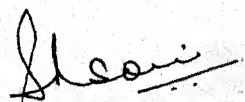
I am also highly obliged to Dr. G.D. Shukla, M.D., Head of the Department of Psychiatry, Dr. B.L. Verma, Ph.D.(Statistics), Statistician-cum Lecturer in S.P.M. and Dr. (Km.) Ratna, M.D., Lecturer in Pathology - all of whom carefully guided and supervised various aspects of this study throughout.

All of my colleagues and friends, whose co-operation and painstaking help are unaccountable, deserve a special word of thanks. Dr. Sushant Khare, Dr. Javaid Ahmed, Dr. S. Agnihotri, Dr. Raksha Pal Singh, Dr. D.R. Singh and Sri Umesh Ahirwar must be particularly mentioned here.

At this moment of glory and award I humbly accept that all credit accrued actually goes to my parents, brothers and wife. Their affection, sacrifices and patience have made all this worthwhile.

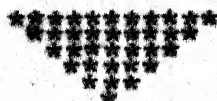
My heartfelt gratitude and thankfulness is for the patients who were the base of this project. To all of them I have to say : 'without you this could not have been possible'.

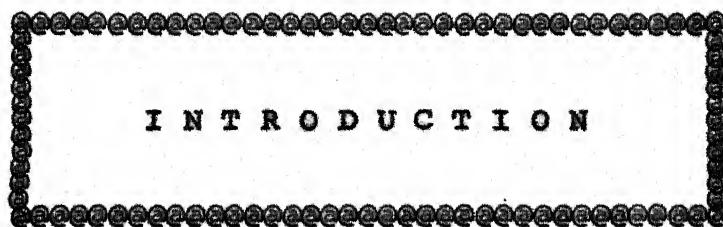
The entire manuscript has been typed in an exemplary manner by Sri K.M. Thomas. I am highly thankful to him for his patient and untiring efforts.


(SRI RAM SONI)

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I N T R O D U C T I O N

INTRODUCTION

Glaucoma, a dreadful blinding condition, known since time immemorial, has been a much debated and disputed subject as regards the rationale and the effectivity of the treatment. Though the various forms of treatment found their place in literature, specially from the period beginning with the dawn of twentieth century, even today none of them - specially the surgical ones could earn the credit of being unopposed. Attempts towards preventive surgical intervention too had been futile.

Moreover, the present pattern of avoiding surgical trauma to the eye as long as medical therapy is tolerable has many drawbacks such as unsatisfactory compliance of the treatment, neglectful attitude towards follow-up visits and the lack of any guarantee of protection against a fresh attack in a good percentage of cases even when conservative therapy is complied within a correct manner (Leydhecker, 1970).

Therefore, some-how or the other, one has to resort to the surgical treatment of the condition.

The surgical form of treatment for relieving this condition had to pass the mandatory course of evolution to the present status. All attempts in this

direction were in vain prior to the introduction of trephining in 1909. This remained the popular-most procedure for almost half a century; even iridencleisis, which was introduced earlier, could not gain momentum for a few decades.

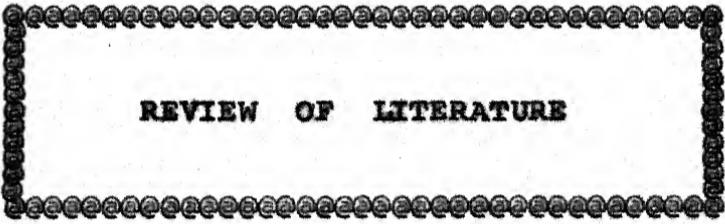
The introduction of Scheie's operation also could not settle the struggle. More recently, the celebrated entry of trabeculectomy revolutionised the mode of surgical treatment and prognosis. Various studies indicate the complexity of the problem through the conflicting range of success claimed (19 per cent to more than 95 per cent) with different procedures in use.

The fact that there are a number of operations designed for glaucoma suggests that there is yet to be an operation which should ideally be such as to preserve the function of the eye, maintain the tension within normal limits, retain the integrity of the globe, and pose minimal complications. This state of affairs will remain until our ideas regarding the etiology of glaucoma (specially simple) are completely clarified for if the surgical interference is considered ideal form of treatment should restore the fluid dynamics of the eye to a normal equilibrium.

All the surgical procedures at present available are imperfect since all of them are liable to

effect visual function and to allow a return of ocular hypertension, while most of them leave the integrity of the eye considerably impaired. To date it seems likely that the trabeculectomy with basal iridectomy is the operation of choice for most of the glaucomatous conditions.

The present study was undertaken for the assessment of results in success (in all terms) of the popular surgical procedures in view of the high number of blinds (about one third of the total) in this region (Srivastava et al, 1978) as comparable to only 0.5% of blinds in this country as a whole (Park, 1980) attributable to glaucoma.



REVIEW OF LITERATURE

REVIEW OF LITERATURE

Glaucoma and cataract have affected the mankind ever since his emergence on the face of the earth. But their true nature was not recognized by ancient Greeks and Romans. The word "GLAUCOMA" first appears in Hippocrates (420 B.C.) together with the amblyopia in the list of diseases affecting old people. "Glaukoma" is an ancient Greek noun meaning 'glaze' such as silveriness of sky or dull sheen of an eye which has lost its brightness. Glaucoma is no definite morbid entity but merely the off colour, lack lustre appearance of the eye turned blind.

The present form of the condition has evolved only through the ages of research. Thus the general concept prevailed that primary glaucoma of all types was due to an obstruction to the drainage of aqueous humour, a new thought, however, suggested by Erich Seidel (1920) and was elaborated by Curran (1920) who advocated the idea of blockage of pupil as the cause of glaucoma.

In the mean time, with the aid of gonioscope, it was pointed out that in some glaucomatous eyes the angle of anterior chamber was closed while in others it was open.

Finally, Barkan (1938) with an improved gonioscope exploited this concept further and divided the condition into glaucoma with, on one hand, a deep anterior chamber and an open angle on the other hand, a shallow anterior chamber the drainage angle of which became closed to produce rise in the tension; he further suggested that in this second type of glaucoma the closure of the angle was due to obstruction of the flow of aqueous and advised a peripheral iridectomy to re-establish communication between the posterior and the anterior chambers as a means of surgical cure, an operation which had been previously advocated by Curran (1920).

THE SURGICAL TREATMENT

The usual treatment of an acute attack of glaucoma, in olden days, had been purging, blood-letting and leeching etc. From Barkan (1938) onwards began the era of achievements and progress in the field of surgical treatment of glaucoma. It became a widely accepted fact later, in the treatment of glaucoma simplex that surgical methods were merely confined to mechanical expedients to relieve the raised tension of the eye, whereas the surgical treatment of closed angle glaucoma particularly in its earlier stages were concerned with the abolition of the deteriorating effects.

Mackenzie (1830) was first to suggest its surgical relief by sclerotomy and later (1854) by paracentesis in chronic stages of the condition. Paracentesis, however, is an obviously unsatisfactory and temporary expedient. The attempt of making the effect permanent (of paracentesis) was made for the first time by Critchett (1857) who in his operation of iridodesis drew a piece of iris with a blunt hook into the wound made at limbus thus introducing the idea of iris inclusion. Albrecht Von Graefe in the same year (1857) announced the effect of basal iridectomy in the treatment of acute glaucoma.

While the effect of an iridectomy in this type of disease was acclaimed to be revolutionary and dramatic, equally good results were found to be absent in the more chronic forms, unless perhaps the iris was incarcerated in the scar (Coccius, 1859; Bader, 1881).

Von Graefe's pupil and ardent admirer, Louis de Wecker (1869-71) devised an anterior sclerotomy with view of increasing the drainage of aqueous by formation of filtering cicatrix. But the results remained unsatisfactory, even though the operation was followed by prolonged massage, as the wound tended to close (Dianoux, 1905).

A more dramatic development was the introduction of small flap sclerectomy procedure, to improve drainage

through fistulous scar, by Herbert of Bombay in 1903.

In 1913 Herbert made the suggestion of wedge resection of sclera at limbus, attached to conjunctiva.

The various surgical procedures are grouped in the following :

A. Sclerectomies :-

- (a) Lagrange's sclerectomy
- (b) Corneo-scleral trephining
- (c) Cauterization of sclera

B. Iris inclusion :- (iridencleisis)

C. Cyclo-dialysis :

D. Trabecular surgery :-

- (a) Trabeculotomy
- (b) Trabeculectomy

The following paragraphs contain the historical developments, however, the procedures included in this study are reviewed with sufficient details.

(A) Sclerectomies :-

De-Wecker's aspiration to establish a filtering scar of a permanent nature was the dictum behind the sclerectomies, wherein the outer coat (sclera) of the eye is excised and may be added with cauterization and usually accompanied by an iridectomy.

(a) Lagrange's sclerecto-iridectomy (1906-1907) :-

The credit for introduction of a satisfactory operation of this type goes to Felix Lagrange (1906). The procedure involved snipping away a piece of scleral lip at the wound made by dissecting a small corneoscleroconjunctival flap, and performing basal iridectomy. After replacing and suturing the flap the procedure makes the free aqueous flow across.

Several modifications were made later to make a cleaner and more extensive apertures, Holth (1909) - anterior lip sclerectomy (by corneal sclerectomy); Berens (1936) used the same method by punching the sclera away anterior to limbus; and posterior lip (of sclera) excision (Posterior lip sclerectomy) by Iliff and Haas (1962). The success rates with these procedures (original/modified) had been 78% - 85% (O'Brien, (1947) - 85% with Lagrange's; Berens and Breakey, (1960) - 78% with former's technique; Haas (1967) - 85% with his own technique).

(b) Corneo-scleral Trephining :-

This procedure became popular only after Elliot (1909) though the basic idea of trephining was of Argyll Robertson (1876) who got good results in his cases. The technique of Elliot consists trephining the scleral piece near limbus and covering it by the flap

of conjunctiva and episcleral tissue. The results obtained were satisfactory.

(c) Cauterization of sclera :-

It was the exploitation of Prezioski's (1924) idea of obtaining a permanent fistulous scar by utilizing electrocautery at the wound margins till the anterior chamber was reached, an iridectomy was not usually done. Harold Scheie (1958) utilized thermo-cautery instead and performed an iridectomy and was successful in 80-90% cases of glaucoma simplex with this procedure.

Although these three varieties of procedures, involving excision or opening of Sclera, were effective in a satisfactory percentage of cases, yet the procedures differ in their complexity and in the rate of post operative complications. Both Lagrange's and Elliot's operations are technically difficult, involve more trauma to the eye and probably tend to subsequent cataract development, than the Scheie's procedure.

Scheie's Operation :

Since the classical description, of fistula formation due to retraction of scleral wound edges after cauterizing them, by Scheie (1958) there had been enormous work using the same principle to relieve glaucomatous raised tension.

Scheie (1959) used this technique on 70 eyes suffering of primary glaucoma (including narrow as well as open angle glaucomas). After operation the tension came down to normal range in 48 eyes, 15 eyes remained hypotensive. Only 7 eyes he reported to have been uncontrolled after surgical intervention. He noticed reformation of anterior chamber delayed for more than 3 days in 25 eyes and hyphaema in 6 of these operated eyes.

Malbran and Malbran (1959) modified the original technique of Scheie by using diathermy coagulation of scleral wound edges in place of thermal cautery (Scheie) and found fall of tension below 23.4 mm Hg. in 41 eyes out of 50 eyes subjected to this technique, however in 6 eyes the tension remained borderline and uncontrolled in 3 eyes.

Tyner et al (1960) used the principles as per description of Scheie on 42 eyes suffering of various types of glaucoma. In their series the tension was controlled in 28 eyes and the tension remained uncontrolled in 8 eyes while rest of the eyes (6) went into hypotony. The complications encountered by the authors were more than those in the series of Scheie. The reformation of anterior chambers was delayed by more than 6 days in 11 eyes. But no operative intervention was needed, post-operative development of

cataract and severe iridocyclitis with posterior synechia formation was recorded in 3 eyes each. The most important complication noted in this series was hyphaema leading to neovascularization of the angle in 6 eyes.

In 1962 Scheie again presented a series of filtering operation as a comparative study while delivering the Albert C. Snell Memorial Lecture. Out of 372 filtering operation 162 were subjected to scleral cautery with iridectomy. The intra-ocular tension got controlled in 86% (140) eyes but post-operatively 21 eyes went into hypotony, anterior chamber reformation was delayed for a week or more in 60 eyes, the presence of blood in anterior chamber was noted in 17 eyes and 2 eyes in the series developed endophthalmitis%.

Sugar (1962) reported that 62.5% (of 24 eyes) got the intra-ocular pressure controlled with Scheie's procedure (XV Mark J. Schoenberg Lecture). He remarked the complications post-operatively; in 16.2% cases no filtering bleb developed, in 66.6% eyes anterior chamber reformation was delayed upto 6-10 days, in 4% of the cases remained hypotonic followed by development of cataract and 8.3% cases endophthalmitis developed.

Bounds et al (1964) obtained control of intra-ocular tension in 87.6% cases in a series of 105 glaucoma cases using the procedure as described by

Scheie; these included 14.3% cases which needed antiglaucoma medication after the surgical intervention. However, there was a notable difference in the successful results on White and Negro glaucoma patients (80.6% and 60.9% respectively, excluding the cases which could be controlled by added medication). Besides the other complications the chamber reformation failed in 10.5%, 16.2%. However, lens changes towards opacification were higher (18%).

Nadel (1966) obtained success in 73.6% cases using Scheie's original procedure on 110 primary glaucoma cases, almost similar to the results of Hilsdorf (1966) in a series of 112 cases. Nadel had to face 28 cases of delayed reformation of anterior chamber; 15 cases with blood in anterior chamber and 13 cases which remained hypotonic.

Similar reports of controlled intra-ocular pressure in 91% cases after Scheie's procedure came from Graham (1966).

Polychronakos et al (1969) with the Scheie's procedure achieved control of intra-ocular tension without the use of the miotics post-operatively in 81.7% cases (out of 423 cases) and in another 10.1% cases with addition of the miotics. Authors noted the higher success in angle closure and secondary glaucoma cases particularly. However, only 26% cases remained

successful (tension 18 mm Hg) with filtering iridectomy (Scheie's) in the series of Berson et al (1969) on African glaucoma population. The delayed anterior chamber formation (41% cases) for more than 6 days was noted in the series. All the cases in this series developed mild iritis. On the other hand in a series of caucasian patients Smith (1969) noted 75% success with Scheie's procedure.

Similarly Sollom et al (1969) reported 85% successful cases by Scheie's procedure (however, only 59% cases had controlled intra-ocular pressure without the use of miotics post-operatively). Whereas complications noted in these cases were much in tune with the series of Berson; flat anterior chamber for more than 3 days - 45%, posterior synechia 19%, and fall in visual acuity by 1 or more line's) of Snellen's chart - 18%. Almost equal successful results (87.7%) by Scheie's procedure were reported by Saiduzzafar et al (1969) in a series of 106 primary glaucoma cases.

Vishwanathan et al (1975) pleaded that the Scheie's procedure still has an important place in surgical management of glaucoma on the basis of 88.2% successful results in their series of 113 cases and with very low rate of complications excepting delayed (for more than 5 days) anterior chamber formation (in 54% cases). Richards et al (1978) performed 47

thermo-sclerostomies using classical (scratch), keratome and guarded incisions. Only 31 cases could be followed up for 2 years. The successful results the authors could attain in 66% cases (72% in whites and 76% in non-whites) and the complications were noted as follows :-

Table of complications

Early complications	%	Late complications	%
1. Shallow or flat ant. chamber	52.3	1. Cataract	36.7
2. Hypphaema	29.4	2. Scarred bleb	13.3 (Keratome incision)
		3. Post synechia	10.0-22.2 (various incisions)
		4. Visual acuity deterioration	70.0

These rates of complications were comparable in all the three varieties incisions used.

The results obtained in Bakker et al's (1979) series were also of the same range (74%) as of Shukla (1980), 79.3% successful cases (Narrow angle group - 75% and open angle group - 84.6%).

Jain et al (1980) attained the 96% normo-tensive cases in a series of 24 eyes subjected in Scheie's

thermo-sclero cautery with peripheral iridectomy.

The successful cases in the series retained the same visual acuity or improved (in small proportion).

However, other complications in these cases amounted to; 29% shallow anterior chamber, 4.2% progression of lenticular opacity, 16.7% cases developed no filtering bleb, in the series.

Spaeth et al (1981), in a controlled study on 15 patients (requiring bilateral surgery for glaucoma), subjected one eye of each case to Scheie's procedure. 75% cases were reported to achieve normal range of tension only by surgical intervention. The series, however, was not free of complications e.g.; cataract progression - 20% cases, anterior chamber remained shallow in - 16%, hyphaema of more than 2 mm. noted in 12%, and deterioration of field of vision was recorded in 24% (6) cases. Similar to Bondeau et al's (1981) prospective clinical trial on efficacy and safety of Scheie's procedure (on 50 cases), 79.5% cases got normotensive (average intra-ocular pressure 13.9 ± 6.4 mm. Hg. after 1 yr.) following surgery alone. 50% of the cases had thin blebs even at the end of 1 year follow-up. The complications enlisted were; worsening of - visual acuity in 59%, visual field - 20%, hyphaema in - 46%, flat/shallow anterior chamber and development of cataract in 10 (20%), cases each, infection/perforation of bleb in - 8%, persistent iritis in - 12% and hypotony in - 20% cases.

Natrajan et al (1982) reported cent percent normotensive cases following Scheie's procedure (on 20 eyes). However, complications were not less than previous reports.

(B) Iris inclusions :-

Following the iridodesis procedure of Critchett, first simple and practical method of iridencleisis was designed by Holth (1906). The principle remained the same. The procedure of Holth involved incarceration of one Pillar of iris in the wound after dividing it tangentially. The technique was subsequently modified; Weeker and Weeker (1948) - torned the iris instead of dividing tangentially; Troutman (1954) - included both pillars (claiming 90% v/s 69% success rates with both pillar and single pillar inclusions respectively).

Iridencleisis :- This procedure could not gain popularity largely because of fear of sympathetic ophthalmia (Friedenwald (1950) - 0.5 - 1.0%; Mackie et al (1954) - 1.9%; Dennis Harris (1961), 0.5 - 1.0%; Tabbara (1976). 3-4% occurence) and late infections as reported by Iliff (1944) etc. Now it is undoubtedly and deservedly very popular procedure where filtering glaucoma surgery is indicated.

Randolph and Robertson (1942) compared success in controlling intra ocular pressure, in early and advanced glaucoma cases and reported 85% success rate in

(51) early and 37% in (61) advanced cases of glaucoma subjected to iridencleisis as compared to that of Iliff's (1944) 54.2% successful cases in Negro patients.

Lemoine (1950) and Legrand (1954) discredited the procedure when they noted the occurrence of cataract (following iridencleisis in 43% and 32.8% cases respectively). Troutman (1954) had 90% success by two pillar inclusion as compared to 69% success by single pillar method. The observations of Randolph et al (1942) were confirmed by Riise (1958) in a retrospective study of 1057 cases (between 1950-1956) which received iridencleisis as surgical intervention for glaucoma. Cassady (1959) reported only 50% overall success with this procedure with no significant difference in Negroes (44% success in 116 cases) and in Whites (52% successful cases out of 121).

On the other hand Scheie (1962) reported very satisfactory (83%) results; 86% success in chronic simple glaucoma cases and 84% in narrow angled glaucoma. But the occurrence of complications was found to be of high rate, hypotony - 3.75%, delayed anterior chamber reformation for a week - 24.1%, and hyphaema - 15.5% cases. Similar reports of hyphaema - 18% cases, delayed reformation of chamber in all cases, hypotony - 84% cases, were presented by Massin et al (1963). They also concluded that this hypotony of long standing led to

cataract formation. However, effective filtration was present in 92% cases.

The successful results at the hands of Vannas and Tevajarvi (1964) were comparatively low (only 70%). Almost equal success (79%) was reported by Graham (1966). This low success rate was attributed by the latter to the exclusion of the cases which developed complications (like progression in lenticular opacity and in visual field loss) and/or required anti-glaucoma medication to control the intra-ocular raised tension.

Dalgleish et al (1965) compared various filtering procedures for glaucoma and concluded that only 3% of the chronic simple glaucoma cases as compared to 19% of angle closure group required repetition of surgery, and hence the filtering surgery was found to be more successful in chronic simple glaucoma, however, the success rates were 52%, for open angle and only 33% for angle closure glaucoma cases.

As opposed to these results Graham et al (1966) achieved success (inclusive of those cases which got the intra-ocular pressure controlled with added anti-glaucoma medication) in over all 83% cases receiving iridencleisis as surgical treatment.

Ben Sira et al (1969) excised tenon's capsule in all their cases while performing filtering surgery, to find 93% cases in which ocular pressure got controlled.

The report of Sugar (1970) contained cent percent successful results after iridencleisis but the development of cataract was also very high 38.5% as compared to the previous reports. Fanta (1948), 73%; Lemoine (1950), 43%; Legrand (1954) estimated that in 32.8% (of 173 post iridencleisis cases) cataract progressed; Leydhecker (1966), 17%; Christiansson (1967) 50% in 50 hypotonic eyes post-operatively.

Gupta et al (1978) reported the reduction in the intra-ocular pressure to a physiological range (mean tension 13.9) in all cases treated with iridencleisis.

Patel et al (1981) achieved the mark of 96% successfulness with iridencleisis and complications were also of low rates, hypotony in 20% cases, delayed (for more than 3 days) chamber reformation 19% cases, hyphaema 4% cases and 10% of cases got the bleb vascularized lately.

(C) Cyclodialysis :-

Following the inscription of the idea that separation of Ciliary body reduced the intra-ocular tension, Heine (1905) conceived the operation of cyclodialysis, and demonstrated a surgical opening

between anterior chamber and supra-uveal space which would allow drainage of aqueous and absorption.

Torok (1923) didn't agree with the mechanism in toto and advocated iridectomy through a separate incision along with cyclodialysis.

In a series of 120 eyes suffering from glaucoma, Stein (1930) reported lasting favourable results (tension reduction to the normal range) in 72% cases of simple glaucoma and in nearly 70% cases of chronic uncompensated glaucoma.

Barkan (1936) attributed the failure of Cyclodialysis in controlling the intra ocular tension, to formation of adhesion at the site of opening by cyclodialysis into anterior chamber. This remark was supported by Gonioscopic evidences to the cause.

Hausman (1937) in his series of 34 cases, which were subjected to cyclodialysis, succeeded in controlling intra-ocular pressure in 44.1% cases with lasting effect. The report contained no account of complications which the author noticed.

Trencose (1940) introduced metallic (magnesium) implant into the cyclodialysis cleft to overcome the problem of failures (80% in his first series because of cicatrization and subsequent reattachment of detached part of ciliary body). He got good results in majority

of cases when cyclodialysis was added with insertion of implant.

However, Duke-Elder (1941) commented that a successful cyclodialysis reduces intra-ocular tension to a lesser degree than by the procedures producing external fistula and track. Thus, when there is a small rise of tension, cyclodialysis is indicated.

Randolph (1943) developed a cannulated cyclodialysis spatula which greatly facilitated the introduction of air into the anterior chamber so as to prevent the closure of the cleft. Louhala et al (1946) reported preliminary results (72%) to be good in their cyclodialysis series but the successfulness retained to only 52% when the same cases followed for 1-10 years. Similar success (45%) was achieved by Mc-Pherson (1946).

Sugar (1947) found that a relatively small number of successful cases of cyclodialysis, after a varying period of time turn into failures. This observation was based on his series of (121 cases) cyclodialysis. The procedure reduced the intraocular tension (only in 47.1% cases) to the normal level. Out of these 47.1% successful cases only 38.6% remained normotensive in a duration of 6 years. In his yet another series of cyclodialysis cases he could achieve only 52% successful results.

However, Barkan (1947) was successful in achieving the intra-ocular tension to a controlled range in 83% cases on which cyclodialysis procedure was performed, but he defined (35 mm. Hg.) intra-ocular tension post-operatively with retained function of the organ, as successful. However, the follow-up was only one year in this series. Contrary to this Kronfeld (1948) got controlled intra-ocular tension in 50% of the eyes after cyclodialysis. O'Brien et al (1949) were successful in 79% cases in a series of 100 cases of primary glaucoma followed-up for one year after cyclodialysis.

Haisten et al (1958) presented a series of 94 cyclodialysis cases in which the authors pushed the air into anterior chamber. The authors marked a case as successful when intra-ocular pressure was below 23 mm.Hg. with/without miotics. Only 84 cases could be followed for 3-33 months of which 19 were the failure (about 22.8%) and complication were encountered (in early post-operative period) in 72% cases, pupillary block in 1% and vitreous haemorrhage and loss 5% each, and in 7% cases cataract developed lately, hypotony in 4%, along with other minor complications.

As observed by Schultz et al (1960) only 53.3% (32 eyes of 60) were successful. These patients were followed from 6 months to 30 years and a further central

field loss was noted in 63.4% cases, whereas 71.7% cases lost peripheral fields.

Sugar (1962), after reviewing the earlier studies of Salus (1920), Stein (1930), Bünge (1933) and his own (1940), quoted that the refractive state of eye takes the form towards myopic side after cyclodialysis as after the filtering operations.

The more recent modification of this procedure known as 'Gonioplasty', in which small polythene 'U' tube is installed to maintain the cleft, was presented by La Rocca (1962).

Gorin (1963) found development of glaucoma after the extraction of cataract, and in these cases he tried cyclodialysis, as a relief surgery to his satisfaction.

Jepson (1964) tried to locate the site and reason of failure of glaucoma surgery through histological examinations of enucleated (96) eyes after failure of surgical interventions. Of these 36 (37.5% of total cases) were subjected to cyclodialysis procedure (and after failure in controlling glaucoma had to be enucleated ultimately) which amounted the highest in the series. This figure definitely reflects the high rate of failures of cyclodialysis procedure. On histological examination the cyclodialysis cleft and the anterior chamber were found to be filled with erythrocytes and polymorphs which

obliterated the channel. He could not submit concised histological basis of failure. The presence of these cells in the cleft points towards presence of blood in the anterior chamber for a considerable period.

Richards et al (1965) used an 'U' shaped polyvinyl tube (as La Rocca) in cyclodialysis cleft and reported high success rate with least complications. The author commented on the mode of action of the procedure as being separation of ciliary body from scleral spur because the tension remained in control even after disappearance of bleb within 6 months. In the same way Gills (1966) used implants after separation of ciliary body. He was successful in 70% cases as against only 17% success by unaided cyclodialysis, Alper (1966).

Molteno et al (1968) reported 72% favourable results by cyclodialysis in a series of 84 cases suffering from open angle glaucoma, and only 14% favourable results by the same procedure on 7 cases of secondary glaucoma.

However, at the hands of Billore et al (1979) the cyclodialysis and cyclodialysis with trabeculectomy procedures were successful in only 60% & 90% cases respectively.

Cyclodialysis was used on 19 cases of post Keratoplasty glaucoma by Kushwaha and Paul (1981). Only 6 (31.5%) out of these cases could be relieved of raised tension.

Agrawal et al (1981) used cyclodialysis in the treatment of aphakic glaucoma, for which this procedure is still widely used. 13 (65%) cases were successful till the period of 6 months of follow-up.

(D) Trabecular Surgery :-

With the fact in mind that glaucoma develops due to improper drainage of aqueous into the out flow channels, de Vincentiis (1893), conceived the idea of opening the channel (Canal of Schlemm) by a knife or probe through anterior chamber. This attempt remained futile as the surgeon was not able to see what was being done? Thus one can consider, 'Goniotomy' the earliest form of surgery on the trabeculum. The feat of this challenge was met by the ingenuity of Otto Barkan (1936) who performed trabeculotomy/goniotomy procedure under direct visualization through the contact glass and got the high percentage of success in congenital glaucoma but in 1956 he faced disappointment on adult glaucomas.

Scheie (1950-63) devised the procedure of goniotomy (Knife passed through the trabeculum to the sub conjunctival space) but success achieved was as low as 50% in juvenile glaucoma cases. Several other workers tried trabeculotomy by ab-externo approach such as; Redmond Smith's (1960-62), Nylon filament trabeculotomy; Burian (1960); Stranahan (1967); etc. opened the canal of Schlemm by passing a probe/knife and entered the anterior

chamber. However, their results were encouraging only for a short term.

(E) Trabeculectomy :-

This procedure is rather much talked about these days, for the relief of glaucoma. Though the seeds of microsurgery (on trabecular tissue) were sowed almost a century ago but it took a fairly long time to come up. Microsurgery for glaucoma attained the momentum only after the trabecular micro-surgery on enucleated eyes of non-glaucomatous subjects by Grant (1958) who calculated the measurements of out-flow facility before and after dissection of trabecular tissue. He concluded that the trabecular mesh-work was responsible for approximately 75% of the total resistance to the out-flow.

The observation made by Grant was later confirmed by histopathological studies of trabecular mesh-work and collecting channels by other workers; Yamashita and Rosen (1965); Larina (1967); Rohen and Rentsch (1969); Mitrowska (1969); Tripathi (1972); Johnstone et al (1973); Frutjen-Drecoli (1973); and Galin et al (1975) etc.

In the period passing thereby, the efforts were being made to cope the need for easier technique with concretely good performance of the procedure which could avoid the risks involved in other types of surgical procedures and to cause less disfigurement of the eyes.

Thus the workers had to stand in line to look for further work towards instigated refinements for a long time. Ultimately the efforts of J.E. Cairns (1968) earned him the credit of developing the procedure of trabeculectomy, who performed this procedure on 17 human subjects and presented the preliminary report. The surgeon was of the view that numerous other operations for relief of chronic simple glaucoma by means of creating channels for sub-conjunctival drainage of aqueous had a high rate of complications, all the more, it seemed unnecessary and unphysiological to create a bypass rather than hitting at the point, the trabecular tissue, which as generally agreed is the seat of obstruction to the outflow of aqueous humour, specially in chronic simple glaucoma. All of Cairns' cases were having controlled intra-ocular tension post-operatively. The author noted minimal complications (one case of iritis which responded to treatment, one iris prolapse out of the group of non-iridectomized cases, shallow/flat anterior chamber for 1-3 days in 7 eyes, very minimal hyphaema in all the cases, but no case exhibited hypotony in the series. Six eyes in this series developed blebs however, 50% cases developed bleb in his second series (Cairns, 1969).

This was an entrance to the era of further studies on the procedure of trabeculectomy after the presentation of overwhelming successful results, by Cairns, and least complications.

Watson (1970) modified the original technique of Cairns (1968) by making limbus based scleral flap and achieved proportionately good results.

Welsh (1972) studied the outcome of trabeculectomy with fistula formation on African patients just to see the successful results with this procedure (because of the common understanding that conventional glaucoma surgery didn't produce satisfactory results). He found astonishingly very low success (28%) with trabeculectomy including the unintentional development of bleb in 14% of eyes. Whereas intermediate (partially successful cases amounted 22%, rest 50% were the absolute failures.

On the other hand Chatterjee and Ansari (1972) performed trabeculectomy on Glaucoma patients of Ghana (Africans) using method of Cairns'. 24 eyes were operated by this method in two groups. One of which includes 12 eyes of advanced glaucoma. The surgical intervention worked well in both groups (success rate 75%). Only 7 eyes developing blebs that too due to leaking at the edges of flap. Similarly Thyer and Wilson (1972), and Ridgway et al (1972) studied on long series of Glaucomatous eyes which were subjected to trabeculectomy. The results obtained by this procedure (in reducing intra-ocular tension) have proved gratifying in both the studies as shown in the tables :-

Table - I

Study of	Primary Glaucoma		Acute Glaucoma		All types of glaucoma other than primary		
	No. of eyes	No. succ- essful	%	No. of eyes	%	Total No. of eyes	Success No. %
Thyer & Wilson	29	25	86.3	26	25	96.1	'
Ridgway et al	42	39	93.0			44	30 68.2

Table - II (Complications)

	Flat A/C		Changes in V. acuity		Cataractous changes		Hyph- Posterior aema synechia	
	%	(all cases)	Not recorded	7%	Not recorded	7%	Not recorded	30% cases
Thyer & Wilson	7%	(all cases)						
Ridgway et al	3%	(all cases)	20%		Not recorded	15%	30% cases	

In many studies in a good percentage of cases, the intra-ocular pressure got controlled after trabeculectomy as reported by Mehta et al (1974), 85.9%; Jerndal & Kriss (1974), 100% (on pseudo exfoliative glaucoma cases); Ridgway (1974), 84.5%; Schwartz et al (1974), 74% with minimum complications; Maskati et al (1974), 90% and Dutta (1974) also achieved good results on 57 cases.

Watson et al (1975) assessed the effectiveness of Watson's modification of Cairns' trabeculectomy on 90 eyes. The intra-ocular tension was controlled in 97% eyes including 6 eyes requiring anti-glaucoma medication post-operatively. It is interesting enough to note that 8.8% cases were having controlled intra ocular tension without development of a filtering bleb. In this series complications encountered were again very minimal, as given in the table :

Table - Complications

Complications	Cases
Shallow A.C.	13
Hyphaema (lasting \angle 2 days)	19
Uveitis	13
Loss of field (despite tension 15 mm Hg)	1
Fall in V, acuity	18
Hypotony	3.33%

In 1975 itself Marcel Back observed, that trabeculectomy gave best results out of all procedures channelizing the aqueous out-flow. Similarly, Gelber and Anderson (1976) commented that trabeculectomy results were satisfactory even when there is a loss of visual field initially, as opposed to previous reports. The comment was based on the authors' results on 57 eyes which were intervened surgically by trabeculectomy procedure, (successful in almost cent percent cases). But one third of the cases had reduction in visual acuity by more than one line of Snellen's test types.

The trabeculectomy procedure produced 82% successful results (inclusive those which had to be added the anti-glaucoma medication) in the series of Freedman et al (1976) and Chauvaud et al (1976). The authors (former) have just enumerated the complications as button holing of conjunctiva during operation, a short lived hyphaema in only 5 cases and scleral staphyloma in 2 cases, which were in the group of those in which scleral flap was not sutured. However, 50% cases of latter's series developed cataract.

In 1977 Peter Wilson presented his observations on long term follow-up study of trabeculectomised patients. All the cases underwent surgical intervention with Watson's modification of Cairn's operation. Out of 309 such eyes 264 eyes had controlled (85.5%) intra

ocular pressure (below 21 mm Hg). The author claimed best results (93% success) on the eyes suffering from angle closure glaucoma. Whereas in open angle glaucoma the author found 87% success rate. As regards the complications, which were encountered were; shallow anterior chamber in 54 cases; hyphaema - 16 cases; late infection only - 1; and central vein occlusion in one case.

Similarly a long series of 330 trabeculectomies followed up 6 months to 3 years (only 165 eyes) Jarndal and Lundstrom (1977) claimed 121 (73.3%) successfully controlled eyes at 1½ years to 3 years. Visual acuity worsened in 136 eyes (of 330 eyes following a period of less than 1 year). This happened because of surgical intervention which directly or indirectly led cataract development obviously, however, arrest of deterioration in visual field was achieved in 91.5% of the eyes. Only a few complications (in 4 eyes) were encountered post-operatively.

Robert-David et al (1977) compared the two procedures of trabeculectomy (Cairns' & Watson's) and followed up for 6-36 months. The authors claimed almost equal results (73.6% by Cairns' procedure and 73.5% by Watson's procedure). However, complications post operatively were minimal by Cairns' method (only two shallow anterior chamber recovering spontaneously) as

compared to that of Watson's procedure (Shallow anterior chamber 3 eyes and severe uveitis and cataract developed within a month of operation in one year each).

Portney (1977) compared the results of trabeculectomy performed for open angle glaucoma and secondary angle closure glaucoma. Results obtained were worth comparison (85.3% successful in primary open angle glaucoma cases and 68.4% successful results in secondary angle closure glaucoma). Hyphaema was the most common complication (30% in primary open angle glaucoma and 40% in the other group). One thing the author noted was high incidence of post-operative (immediate) rise in intra-ocular tension.

The progression of visual field loss after trabeculectomy with pressure under control, was the subject of interest to Werner et al (1977) who in about 50% eyes (10 out of 24 such eyes) found deterioration of visual field despite the effective control of intra-ocular pressure.

The procedure was further put to a trial as is obvious from various studies of 1978. Reports of Stanford-Smith (1978) and Watkins et al (1978) are worth comparison :

Study by	Controlled I.O.P. (%)	Flat/ Shallow ant. chamber(%)	Hyphaema (%)	Development of cataract (%)
S. Smith	65	2	6	Not reported
Watkins <u>etal</u>	90	6	43 (small in 41)	4

Mital et al (1979) reported 100% successful results in a series of 28 glaucoma (chronic simple cases) cases subjected to trabeculectomy. However, complications were of very high rate iritis 32%, hypotony 21.4%, cataract development 17.8%, secondary hyphaema and delayed anterior chamber reformation 35% cases each. Comparable (93.3% successful) results were achieved by Maria et al (1980) who performed Cairns' procedure without using operating microscope on 45 chronic simple glaucomatous eyes. A filtering bleb developed in all eyes (16 flat, 27 diffuse and 2 prominent blebs), as regards the complications these were recorded totaling 31% cases (delayed anterior chamber reformation and hyphaema in 8.9% cases each; iritis and conjunctival gaping in 6.6% cases each).

Jay et al (1980) studied characteristics of reduction in intra-ocular pressure following trabeculectomy on 98 eyes with primary open angle glaucoma. Reduction in the pressure was proportional to the untreated

pre-operative pressure. The results indicated that the first trabeculectomy (as is the usual) reduced the intra-ocular pressure to between 16-20 mm.Hg. irrespective of its initial level. In addition the cases requiring added anti-glaucoma medication afterwards had the reduction in tension only slightly above 20 mm Hg. thus could be considered to be successful cases as they reached the physiologically normal range.

Zaidi (1980) followed the trabeculectomized (66) cases for 4 yrs. Main post-operative complication remained hyphaema. Intra-ocular tension was below 21 mm.Hg. in 80.7% cases after one year as compared to 80.0% success rate after 4 years. Visual acuity worsened to the range of 6/18 - 6/60 in 11% cases and less than 6/60 in 19% cases. Other complications encountered were : hyphaema - 53%, shallow anterior chamber - 11.6%, Uveitis - 4.5% and late cataract in 9.8% cases each after 6 months. However, Jain et al (1980) were successful in controlling intra-ocular tension by trabeculectomy in 96.4% cases.

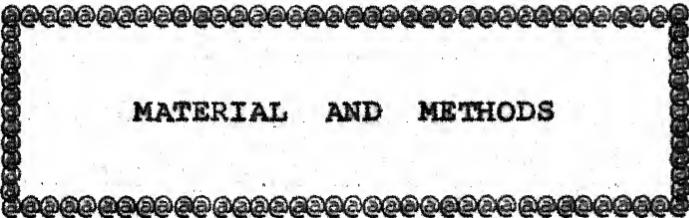
Contrary to previous studies Spaeth et al (1981) reported about 67% successful results and complications encountered were; hyphaema - 2 cases; progression of cataract - 6 cases and worsening of visual field - 1 case.

However, Mills (1981) reverted the findings of Spaeth et al and (in a retrospective long term follow-up of 444 cases on which (Watsons' modification of Cairns' trabeculectomy was performed) reported successful results in 86.9% on chronic simple glaucoma, 90.2% on acute angle closure glaucoma and 75% in aphakic glaucoma. The lowest success achieved in (12.4%) rubeotic glaucoma. Regarding complications, none were serious except 0.5% endophthalmitis and 0.2% eyes had to be even cleaned (remained painful eye). The visual acuity had a fall by more than 2 lines in 15.2% cases.

These successful results of trabeculectomy were further supported through the other reports, Robert-David (1981) excising $1/2 - 4/5$ thickness of posterior scleral layer depending on the degree of raised tension, were successful in 97.3% cases; Bondeau et al (1981), in a randomized prospective study were successful in 81.0% cases but visual acuity deteriorated in 47.6% cases; Banerjee et al (1981) in a series of 70 cases achieved excellent results; Patel et al (1981) on various types of glaucoma achieved success in 95% cases and Sharma and Singh (1981) presented that trabeculectomy procedure was successful in controlling the intra-ocular tension in 94% cases of aphakic glaucoma. However, the complications were also of high

rate; mild iritis 36%, hyphaema 16% and shallow anterior chamber in 8% cases. However, Kushwaha and Paul reported only 53.3% successful cases after trabeculectomy on post-keratoplasty glaucoma cases.

Natrajan et al (1982) subjected 20 eyes suffering of primary glaucoma, to trabeculectomy procedure without using operating microscope. Authors achieved normal intra-ocular tension in 95% eyes, comparable to the results of the study of Hasan et al (1982). Visual acuity deteriorated in only 2 eyes (10%). Other complications recorded were, development of bleb, in 75% cases though thick and diffuse, flat anterior chamber and mild hyphaema in 5% eyes each, anterior and/or posterior synechia formation in 20% eyes, cataract progressed in 10% cases and hypotony (tension less than 8 mm.Hg.) in 15% eyes.



MATERIAL AND METHODS

MATERIAL AND METHODS

The Material :- The present study, conducted at M.L.B. Medical College Hospital, Jhansi includes the established cases of glaucoma which were admitted to the department of Ophthalmology. These were the cases requiring surgical intervention for their ailment after the failure of medical therapy or the cases in which the surgery became inevitable (acute cases presenting lately).

The patients were of either sex and of more than 30 years of age. A total number of 105 patients were studied, however, the patients who could not be followed up for a minimum of 3 months period were excluded. Thus only 61 patients (70 eyes) remained who were followed up for 3-6 months. These patients were subjected to various surgical procedures (iridencleisis - 14 eyes; Scheie's operation - 19 eyes; cyclodialysis - 8 eyes and trabeculectomy - 29 eyes).

The Methods :- All the patients were inquired about the history of present illness (presenting symptoms/ detected incidentally, coloured halos, headache and eye aches with severity and duration, any association with vomiting, redness of the eye(s) and acute/chronic

diminution of vision or appearance of black spots before the eye); history of same type of disease, the patient suffered in past, or any of the blood relation of the patient suffered. A history regarding systemic diseases like diabetes, hypertension etc. was inquired too.

The General Examination :- The pulse, blood pressure and body temperature of all patients were recorded.

Local Examination :- It consisted of the examination of the eye, under bright illumination and with magnification (loupe lens/slit lamp), for congestion of conjunctiva; detailed examination of cornea, iris, pupil - size, shape. The reaction to light of the pupil and lens for its transparency were also examined.

Routine investigations :- Urine for presence of albumin and sugar and microscopic examination were performed.

Blood :- for total and differential leucocyte counts, haemoglobin and erythrocyte sedimentation rate.

Special investigations (for glaucoma) :-

1. Tonometry - Schiötz tonometry was performed as a routine and tonometry by applanation was performed whenever possible.
2. Slit lamp examination - for concised localization of findings and minute examination of anterior segment (including evidence of pupillary block).

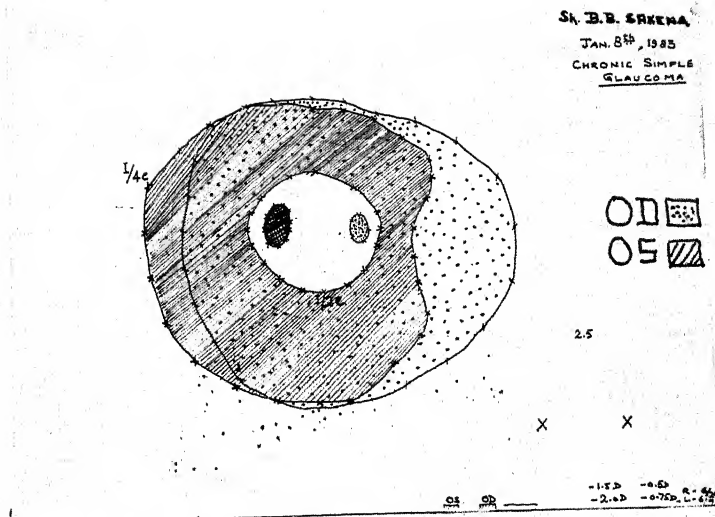


Fig. 1 : Goldmann's Kinetic Perimetry showing, R-E. Normal visual field (I/4 e).
L.E. - Enlargement of blind spot (I/1 e) and field constriction (I/4 e).

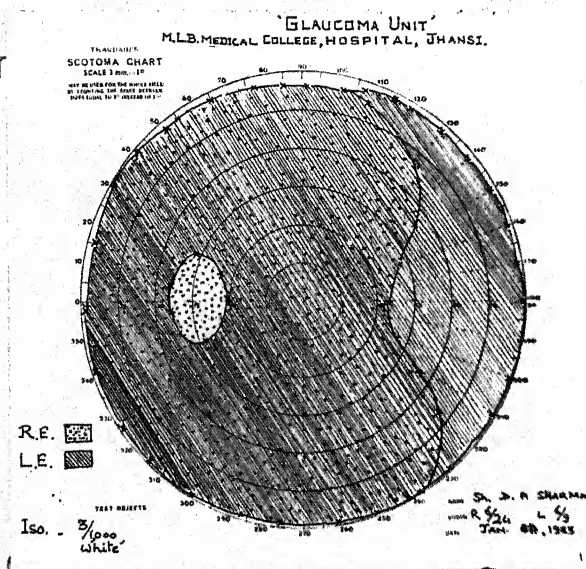


Fig. 2 : Scotometry Bjerrum's showing, R.E. - Baring of blind spot and L.E. - Normal.

3. Distant direct ophthalmoscopy - for transparency of lens.
4. Fundus examination - performed as following :
 - Media
 - Disc-colour, cup depth and any shift of vessels.
 - Any other abnormality.
5. Gonioscopy - for noting the
 - Abnormal deposition of pigment etc. at chamber angle.
 - Peripheral anterior Synechia - neovessels at angle.
 - Angle status - Open (Grades) I, II, III, IV (Becker & Shaffer, 1969).
 - Closed
6. Visual status :-
 - (a) Acuity - PL/PR/Count fingers/assessment by Snellen's test types.
 - (b) Field - Confrontation)
 - by Goldman (when possible))
 - Central field (Bjerrum's) Methods
 - screen) for any scotoma/)
 - field defect.)

When the patient was fully investigated and found fit for operation, he was subjected to surgical intervention by any of the procedures (iridencleisis, Scheie's operation, cyclodialysis or trabeculectomy) depending on the need and on the choice of the surgeon.

Pre-operative preparation of the patients :

The patients were mentally prepared to undergo surgery. To relieve the mental tension and anxiety - 5 mg tablet diazepam one at night and one in the morning were given. Part preparation was done.

Inj. Pentazocine 1 amp (30 mg) and inj. phenargan amp. (50 mg Promethazine) were given as pre-medication just 30 minutes prior to surgery.

Anaesthesia :- Topical drops - Xylocain 4% instilled frequently for surface anaesthesia.

- Facial block - was done with Xylocain 2% injection.

- Ciliary block - by retrobulbar injection of Xylocain (2%) 0.5 ml followed by massage of the eye globe.

Procedural steps of operations :-

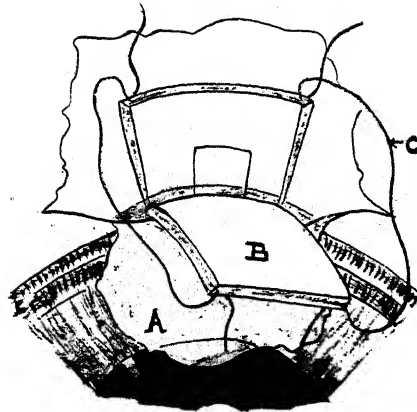
The procedures included in the study were -

1. Iridencleisis, 2. Scheie's operation
3. Trabeculectomy, and 4. Cyclodialysis.

The common steps are described as below :-

After the full local anaesthetization part was cleaned properly and exposed.

Operative steps : Trabeculectomy.

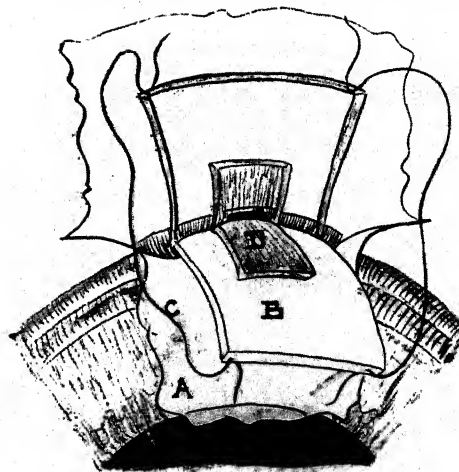


A. CONJUNCTIVAL FLAP.

C. SILK SUTURES.

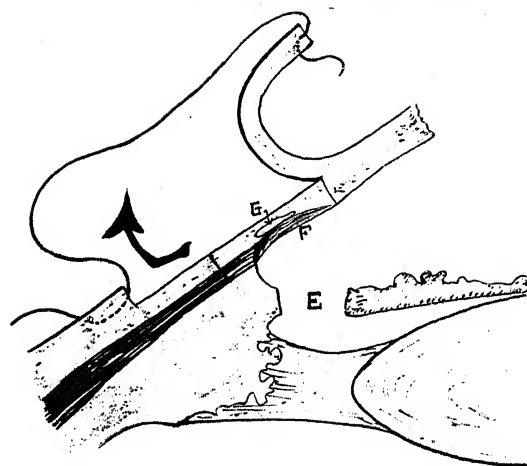
B. SUPERFICIAL CORNEO-SCLERAL FLAP.

Fig. 3 : Limbus based 4 x 4 m.m. half thickness superficial scleral flap - going deep into cornea (B).



D. DEEP CORNEO-SCLERAL PIECE.

Fig. 4 : Deep corneoscleral flap made (D).



E. PERIPH. IRIDECTOMY [COLOBOMA].
F&G TRABECULAE & SCHLEMM'S CANAL.

Fig. 5 : The block of tissue removed containing scleral spur, Schlemm's canal (G) and trabecular meshwork (F).

The operating microscope was not used. A 4x4 m.m. limbus based partial thickness flap of sclera was dissected, going to 1-1.5 m.m. inside the cornea, by Bard Parker knife. This flap was also reflected anteriorly to expose the deeper layer out of which 2x2 m.m. piece of sclero-cornea was excised and a peripheral iridectomy was performed. The superficial scleral flap was sutured with buried stitches using 8/0 or 10/0 silk. Conjunctivotenon's layer was sutured with 5-6 interrupted/running silk stitches.

(d) Cyclodialysis :- The ciliary body was detached from scleral spur by cyclodialysis spatula introduced through a Scleral nick made 8 m.m. away from limbus and concentric to it usually in the upper temporal quadrant. Air was injected into the chamber followed by suturing of conjunctiva by running stitches.

Complications during operation :- The unwarranted events during operation (including button holing of conjunctiva, loss of anterior chamber, unwarranted trauma to iris or to lens and/or loss of vitreous) were recorded.

Post-operative treatment :-

All patients were administered suitable systemic antibiotic and anti-inflammatory drugs in full doses for 5 days.

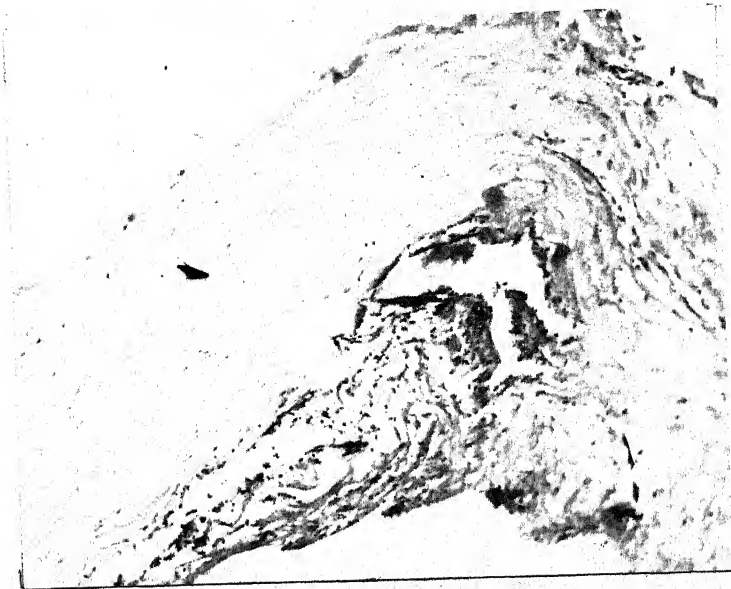


Fig. 6 : Light microscopic histopathological view of the corneoscleral piece, showing Schlemm's canal, scleral spur and trabecular tissue (X 400).



Fig. 7 : A trabeculectomized patient (R.E.) Showing thick diffused bleb and stitches on.

The various data were compiled and processed
to derive the conclusion.



OBSERVATIONS

OBSERVATIONS

The present study was conducted on 128 eyes of 105 patients, unfortunately 44 patients out of these didn't turn up for follow-up and hence were discarded from the study. Thus the study group consists of 61 patients of varying ages as depicted in table - 1.

TABLE - 1 : Age and sex distribution of the patients.

Age group years	Sex		Total No.	%
	Male	Female		
26 - 30	-	1	1	1.63
31 - 35	1	3	4	6.55
36 - 40	3	3	6	9.83
41 - 45	3	6	9	14.75
46 - 50	6	8	14	22.95
51 - 55	5	6	11	18.03
56 - 60	3	4	7	11.47
61 - 65	2	2	4	6.55
66 and above	3	2	5	8.18
Total	26	35	61	100.00

Mean \pm S D = 51 \pm 10.6 years				

The patients included were ranging from 30 to 91 years of age. Maximum number of patients (14) fall in the range of 46-50 years. The mean of the age 51 years deviates with $SD \pm 10.6$ years. These were of either sex. The table - 1 further represents that the females patients out numbered the males with a ratio of roughly 1.4 : 1.0.

TABLE - 2 : Diagnostic distribution of eyes and operation performed.

Operation	Iriden- cleisis	Scheie's	Cyelo- dia- lysis	Trabecu- lectomy	Total
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Acute Congestive	6 (8.5)	4 (5.7)	- -	8 (11.4)	18 (12.7)
Chronic Simple	5 (7.1)	8 (11.4)	- -	12 (17.1)	25 (13.7)
Chronic angle closure	3 (4.2)	6 (8.5)	- -	5 (7.1)	14 (20.0)
Combined mechanism	- -	1 (1.4)	- -	2 (2.8)	3 (4.3)
Aphakic	- -	- -	8 (11.4)	2 (2.8)	10 (14.3)
Total No. of eyes	14	19	8	29	70
(%)	(20.0)	(27.1)	(11.4)	(41.4)	(100.00)

In this study, (Table - 2). preceeding, maximum number of eyes were suffering from chronic simple glaucoma (25 eyes). The other types of glaucoma which the eyes were suffering from, acute congestive (18 eyes), chronic angle closure (14 eyes), aphakic glaucoma excluding malignant glaucoma (10 eyes) and combined mechanism glaucoma (only 3 eyes) as revealed by table 2. The table further shows the distribution of type of glaucoma and the operation performed. Out of 18 acute congestive glaucomatous eyes 6 (8.5%) were operated by iridencleisis, 4 (5.7%) by Scheie's procedure and 8 (11.4%) by trabeculectomy; similarly the eyes suffering of other types of glaucoma were operated by various procedures, iridenclesis, chronic simple glaucoma 5 eyes (7.1%) and chronic angle closure glaucoma 3 eyes (4.2%); Scheie's - Chronic simple glaucoma 7 eyes (11.4%), chronic angle closure glaucoma 6 eyes (8.5%) and combined mechanism glaucoma only 1 eye (1.4%), trabeculectomy was performed upon 12 eyes (17.1%) with chronic simple glaucoma, 5 eyes (7.1%) with chronic angle closure glaucoma, 2 eyes (2.8%) with combined mechanism glaucoma and 2 eyes (2.8%) with aphakic glaucoma, however, cyclodialysis was performed exclusively on the eyes suffering from aphakic glaucoma 8 eyes (11.4%). Thus, 14 eyes (20.0%) were operated by iridencleisis, 19 (27.1%) by Scheie's, 8 eyes (11.4%) by Cyclodialysis and 29 eyes (41.4%) by Watson's modification of Cairns' trabeculectomy procedure.

TABLE - 3 : Distribution of pre-operative tension
of eyes and the operation performed.

Operation	Iriden- cleisis	Scheie's operation	Cyclodia- lysis	Trabecu- lectomy	Total
Tension range mm. Hg.	No.	No.	No.	No.	No. (%)
21 - 30	8	7	3	14	32 (45.7)
31 - 40	1	5	1	7	14 (20.0)
41 - 50	1	3	3	5	12 (17.1)
51 and above	4	4	1	3	12 (17.1)
Total					70 (100.00)

Mean \pm S D = 35.5 \pm 12.1					

Table - 3 is the representation of the distribution of patients according to the pre-operative tension. The patients showed a raised intra-ocular pressure (tension) ranging from just above the physiological upper limit to the level of more than 51 mm Hg. Maximum number of the eyes (32, 45.7%) were having the raised tension in the range of 21 - 30 mm.Hg. Only 12 of the eyes showed the raised tension to 51 mm.Hg. or more.

TABLE - 4 : Visual acuity (pre-operative).

Visual acuity	Iriden- cleisis	Scheie's operation	Cyclo- dia- lysis	Trabecu- lectomy	No. %
Doubtful PL	-	2	-	-	2 (2.8)
PL + (PR \pm)	5 (4 PR \pm)	6 (2 PR \pm)	-	10 (4 PR \pm)	21 (30.0)
H.M.	-	-	-	2	2 (2.8)
F.C. at 1 Foot	-	5	-	3	8 (11.8)
6/60 or less	2	2	5	2	11 (15.9)
6/36 - 6/24	2	4	3	8	17 (24.3)
6/18 or more	5	-	-	4	9 (12.8)
Total	14	19	8	29	70(100.0)

P.L. = Perception of light, \pm = Doubtful,

H.M. = Hand movement, P.R. = Projection of rays,

F.C. = Finger counting.

Table 4 shows the acuity of vision of eyes at the pre-operative check-up. Maximum number of eyes were having only perception of light and projection of rays, amounting 21 eyes (30%). Out of 70 eyes, 44 were having no useful vision. Visual acuity was ranging from as low as doubtful perception of light to 6/18 or better.

TABLE - 5 : Pre-operative status of visual field (Central).

OPERATION	IRIDENCECTOMY		SCHEIE'S OPERATION		CYCLODIALYSIS		TRABECULECTOMY		TOTAL	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
NORMAL	2	(2.85)	-	-	-	-	9	(12.85)	11	(15.7)
E.B.S.	2	(2.85)	1	(1.42)	2	(2.85)	7	(10.0)	12	(17.1)
BBS + N.S.	5	(7.14)	4	(5.71)	3	(4.28)	4	(5.71)	16	(22.8)
ONLY TUBULAR VISUAL FIELD	-	-	1	(1.42)	2	(2.85)	-	-	3	(4.28)
NOT FEASIBLE	5	(7.14)	13	(18.52)	1	(1.42)	9	(12.85)	28	(40.0)
TOTAL NO. OF EYES	14	(20.00)	19	(27.14)	10	(14.28)	29	(41.42)	70	(100.0)

E.B.S. - Enlargement of blind spot.

B.B.S. - Baring a blind spot.

N.S. - Nasal step or any scotoma.

The status of visual field (central) prior the surgical intervention is depicted in Table 5. It was not feasible to record the central visual field in 28 eyes (40%) either because of poor visual acuity or due to non-cooperative attitude of the patients. Out of 42 feasible eyes, 11 were having normal field of vision and rest 31 eyes were having either enlarged blind spot (12 eyes - 17.1%); baring of blind spot, nasal step or scotoma (16 eyes - 22.8%); or only tubular field of vision (3 eyes - 4.2%). Two of the 3 eyes which were having only tubular visual field were aphakic (and received cyclodialysis as surgical treatment for glaucoma) and one phakic eye was operated by Scheie's procedure.

Table 6 reveals the account of various complications noted at the time of operation. The percentage of the complications shown in the Table has been computed with respect to total number of eyes operated by the particular procedure as 100%. Incidentally there was button holing of conjunctival flap in one eye each with Scheie's procedure (5.3%) and trabeculectomy (3.4%). As trabeculectomy was the only procedure in the study involving dissection of sclera hence the tear of superficial flap of sclera was encountered in 1 eye (3.4%) in trabeculectomy exclusively. The most common complication in the study was the presence of blood in

anterior chamber either because of the entry from wound edges of sclero cornea/iris or due to separation of the coats of eye ball (as in cyclodialysis).

The blood was not washed during operation in any case. Four of the eyes operated by cyclodialysis had good amount of blood in the chamber. Very minimal blood was present in 3 eyes operated by iridencleisis, 2 eyes by Scheie's procedures and 1 eye by trabeculectomy. Another four of the eyes operated by iridencleisis (1 eye) and Scheie's procedure (3 eyes) were with considerable amount of blood. The highest of cases with presence of blood in anterior chamber were of those receiving cyclodialysis 50% and trabeculectomy falls at the lowest rank (3.4%) with only a streak of insurgent blood in the chamber. One eye suffered an accidental injury to the lens while the chamber was being open by stab incision for iridencleisis. Similarly one aphakic eye operated by trabeculectomy procedures developed plugging of vitreous in the surgical opening. The total complications developed during operation highest in cyclodialysis (50%), followed by iridencleisis (35.7%), Scheie's (31.4%) and trabeculectomy (13.7%). However, total complications were found to be insignificant statistically ($P > .05$).

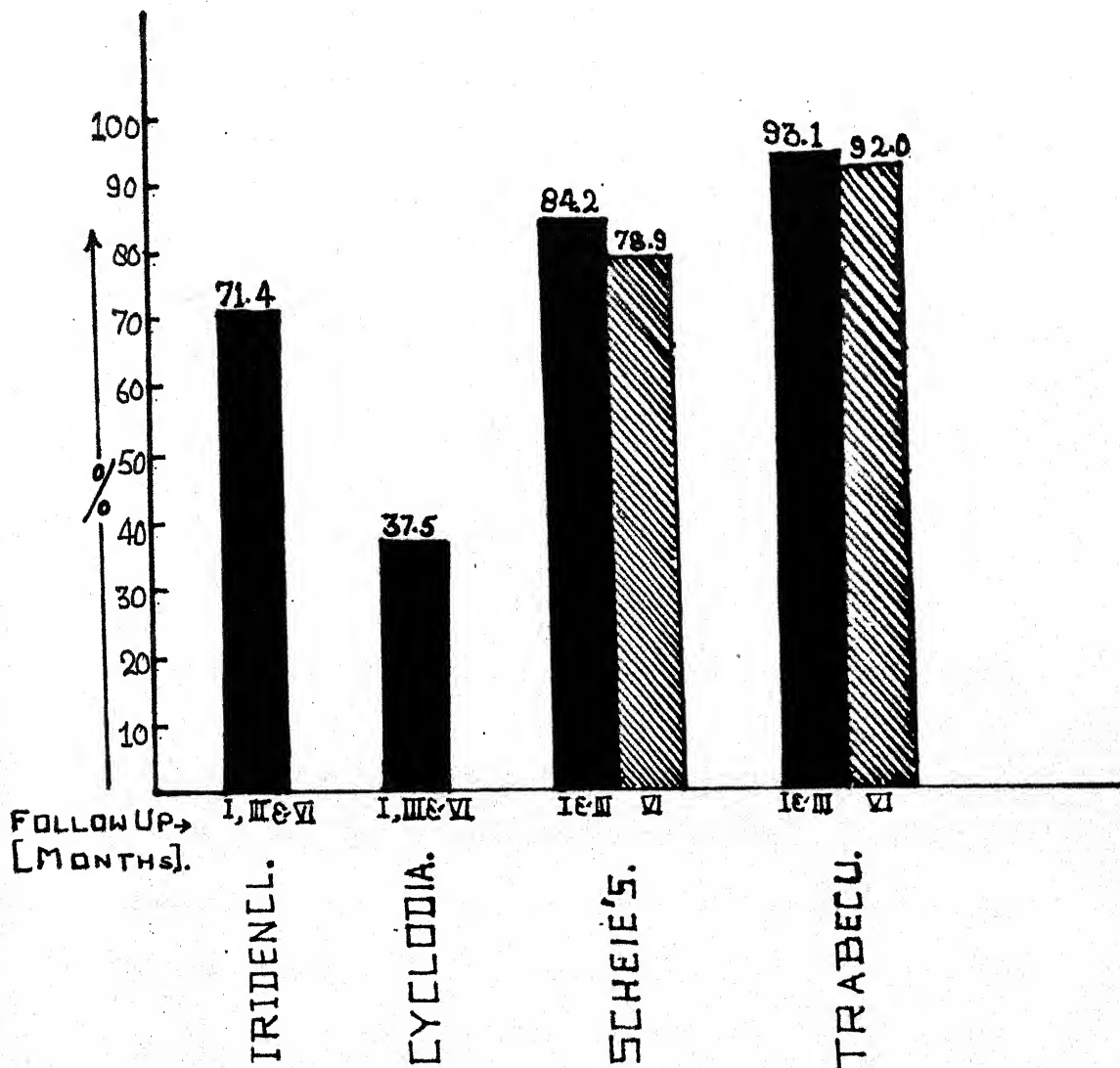


FIG. 8. SHOWING RESULTS OF PROCEDURES.

TABLE - 7 : The results by various procedures at follow-up.

Follow-up Operation	1 - 3 months			6 months		
	No.of eyes	Controlled tension		No.of eyes	Controlled tension	
		No.	(%)		No.	(%)
Iridencl.	14	10	(71.4)	14	10	(71.4)
Scheie's	19	16	(84.2)	19	15	(78.9)
Cyclodialy.	8	3	(37.5)	8	3	(37.5)
Trabeculec.	29	27	(93.1)	25	23	(92.0)
Total	70	56	(80.0)	66	51	(77.3)

χ^2		12.96			11.40	
P		< .01			< .01	

Table - 7 and fig.-8 reveal the number of eyes having controlled tension following the surgical treatment. The intra-ocular pressure was controlled (below 21 mm.Hg.) in 56 (80%) eyes out of total 70 eyes at 1 and 3 months follow-up. The split up of these results indicates that iridencleisis procedure was successful in bringing down the intra-ocular pressure to a tolerable range in 71.4% (10 out of 14) eyes irrespective of the types of glaucoma; Scheie's operation controlled the intra-ocular tension in 16 out of 19

eyes (84.2%). The lowest successful results were with cyclodialysis which caused the intra-ocular pressure drop to a normal limit in 37.5% eyes (3 eyes out of 8 eyes) only; while the maximum successful results were obtained by trabeculectomy in 93.1% (27 out of 29 eyes).

This difference in the successfulness of the various procedure, as regards the bringing the intra-ocular pressure down to a tolerable physiological limit, is highly significant statistically ($\chi^2 = 12.96$, $P \leq 0.01$).

At the latest follow-up as table further represents four of the trabeculectomy eyes could not be followed. The overall successful results with all the procedures dropped down to 77.3% only, the success rates with iridencleisis and cyclodialysis remained stationary (71.4% and 37.5% respectively). However, there was a little fall in success rates by Scheie's procedure at the follow-up to only 78.9% and by trabeculectomy to 92.0%. Again the difference of results with various procedures is highly significant statistically ($\chi^2 = 11.40$ and $P \leq 0.01$).

I. IRIDENCELSIS.
 S. SCHEIE'S OPERATION.
 L. CYCLODIALYSIS.
 T. TRABECULECTOMY.

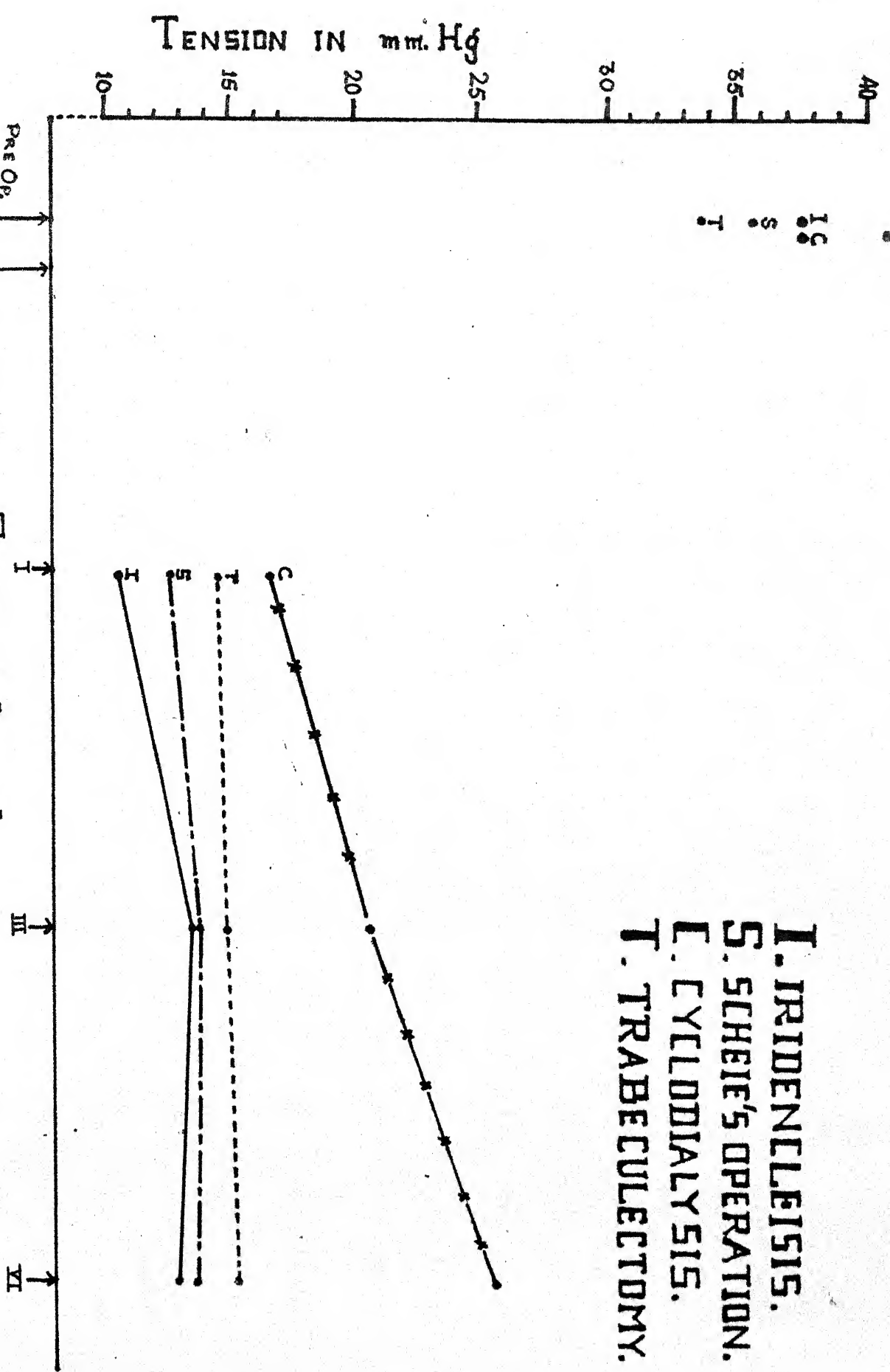


Fig. 9. SHOWING THE I.O.P.'s FOR VARIOUS PROCEDURES.

TABLE - 8 : Quality of control in intra-ocular tension.

Operation	Pre-operative intra-ocular tension ($\bar{X} \pm SD$) mm. Hg.	Post-operative tensions at different periods			Total No. of eyes
		At 1 month	At 3 months	At 6 months	
		I.O.P. ($\bar{X} \pm SD$) mm. Hg.	I.O.P. ($\bar{X} \pm SD$) mm. Hg.	I.O.P. ($\bar{X} \pm SD$) mm. Hg.	
Iridencleisis	37.7 ± 13.5	10.6 ± 2.19	13.44 ± 2.43	13.12 ± 3.27	14
Scheie's operation	35.92 ± 11.44	12.76 ± 2.99	13.80 ± 3.10	13.83 ± 3.92	19
Cyclodialysis	37.88 ± 8.26	16.75 ± 3.92	20.65 ± 4.38	25.85 ± 3.54	8
Trabeculectomy	33.77 ± 12.48	14.52 ± 2.4	15.08 ± 1.99	15.43 ± 2.22	29

Table - 8 (Fig. -9) represents the statistical analysis of quality of control of the tension for the four groups separately. The tension reached within normal physiological limits by trabeculectomy (1 month 14.52 ± 2.24 , 3 months 15.08 ± 1.99 and 4 months 15.43 ± 2.2 mm. Hg) in follow-up. At 1 month the intra-ocular pressure observed was 10.6 ± 2.19 mm.Hg. by iridencleisis, 12.76 ± 2.99 mm.Hg. by Scheie's operation and 16.75 ± 3.92 mm.Hg. by Cyclodialysis; at 3 months 13.44 ± 2.43 mm.Hg. by iridencleisis, 13.8 ± 3.1 mm.Hg. by Scheie's, and 20.65 ± 4.38 mm.Hg. by cyclodialysis operations. Similarly, at 6 months 13.12 ± 3.27 mm.Hg. by iridencleisis, 13.8 ± 3.9 mm.Hg. by Scheie's, and 25.8 ± 3.5 mm.Hg. by cyclodialysis operations. The data clearly depicts that the control of intra-ocular pressure following trabeculectomy has been of much better quality than with the others, as trabeculectomy caused reduction in the tension towards much more physiological range of it.

The amount of the intra-ocular pressure dropped from the initial has been calculated for 1, 3 and 6 months follow-up and has been shown in table - 9. The fall in the tension by various procedures when compared is non-significant (table - 10), whereas the fall in the tension by a single procedure at different follow-ups was found to be significant statistically (table - 11).

TABLE - 9 : Frequency distribution of fall in intra-ocular pressure at follow-ups.

Range of Tn. mm.Hg.	At months	14.9 or below	15 - 24.9	25 - 35.9	35 - 44.9	45 & above	Mean \pm SD mm.Hg.		
							1 month	3 month	6 month
Operation									
Iridencleisis 14 eyes	I III VI	5 7 7	4 2 3	- 1 -	2 1 1	3 3 3	25.1 \pm 13.6 24.2 \pm 14.0 23.2 \pm 14.0		
Scheie's 19 eyes	I III VI	3 2 3	9 9 11	4 4 1	1 2 1	2 2 3	26.1 \pm 11.4 26.2 \pm 11.9 24.7 \pm 13.1		
Cyclodialysis 8 eyes	I III VI	4 4 4	- 2 3	3 1 1	1 1 -	- - -	21.1 \pm 8.9 17.3 \pm 10.8 11.5 \pm 8.7		
Trabeculectomy 29 eyes (I & III) 35 eyes (VI months)	I III VI	11 12 8	11 10 10	4 4 4	- 1 2	3 2 1	20.1 \pm 10.8 19.7 \pm 10.6 20.8 \pm 11.5		

TABLE - 10 : Statistical analysis of amount of tension drop by different operations at follow-ups.

	A V/S D	B V/S D	C V/S D	A V/S B	A V/S C	B V/S C
<u>At initial follow-up</u>						
t value	1.29	0.18	0.55	0.2	0.76	1.07
P value	7.05	7.05	7.05	7.05	7.05	7.05

<u>At final follow-up</u>						
t value	0.6	1.04	2.2	0.3	2.3	2.6
P value	7.05	7.05	<.05	7.05	<.05	7.05

N.B. A = Iridencleisis- 14, C = Cyclodialysis - 8,
B = Scheie's operation-19, T = Trabeculectomy - 29.

TABLE - 11 : Statistical analysis of tension drop by individual operation at different follow-up times.

Operation	Iriden- cleisis	Scheie's	Cyclo- dialysis	Trabeculectomy
N =	14	19	8	29 for 1 & 3 months, 25 for 6 months.
<u>Follow-up</u>				
1 month V/s				
3 months				
t value	2.37	1.55	4.3	3.6
P value	<.05	<.05	<.005	<.005

3 months V/s				
6 months				
t value	1.44	2.88	3.99	4.6
P value	<.05	<.05	<.005	<.005

TABLE - 12 : Incidence of bleb and their characteristics at the follow-up examination.

Bleb	Iriden-		Scheie's		Cyclo-		Trabecu-		Total	
	cleisis		operation		dialysis		lectomy		70 eyes	
	14	19	8	29						
	No.	%	No.	%	No.	%	No.	%	No.	%
Presence of Bleb	12	84.7	16	84.2	-	-	24	82.7	52	74.2

Characteristics of bleb										
Thin diffuse	5	35.7	8	42.1	-	-	2	6.8	15	21.4
(Encroaching cornea)	(2)	(14.2)	(1)	(5.2)						

Thin cystic	4	28.5	5	26.3	-	-	-	-	9	12.8

Thick diffuse	-	-	-	-	-	-	21	72.4	21	30.0
(Encroaching cornea)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)		

Vascularization of bleb	(1)	(7.1)	(1)	(5.2)	-	-	(1)	(3.4)	(7)	(10.0)

Scarred/ Thin Flat	3	21.4	3	15.7	-	-	1	3.4	7	10.0
(S) (Tf)	(S-2, Tf-1) (S-1, Tf-2) - - (Tf-1)									

The preceeding table - 12 shows the formation of filtering bleb after operation in 71.4% (52 eyes) eyes. Thus in 10 eyes there was non development of bleb (excluding 8 eyes operated by cyclodialysis) unexpectedly, 5 eyes of trabeculectomy group (of which 4 were successfully draining the aqueous); 2 eyes of iridencleisis; and 3 eyes of Scheie's operation group. The characteristics of the blebs too are depicted in the table. Fifteen (21.4%) eyes had thin diffuse blebs (5 eyes of iridencleisis group, 8 of Scheie's group and 2 of trabeculectomy group - of these 2 blebs of iridencleisis and 1 bleb of Scheie's group were encroaching cornea). The cystic thin blebs were seen in 4 eyes of iridencleisis group and 5 eyes in Scheie's operation group total 9 (12.8%) eyes.

Thick and diffused blebs were seen in 21 (72.4%) eyes operated by trabeculectomy, exclusively. One bleb each from iridencleisis, Scheie's and trabeculectomy group, got vascularized later. The blebs later got scarred and/or became flat in 3 eyes each of iridencleisis and Scheie's groups while only 1 eye developed scarring of bleb in trabeculectomized eyes.

TABLE - 13 : Incidence and absorption of hyphaema
post-operatively.

Operation	Hyphaema Present	Absorbed by		
		1 day	3rd day	7 3rd days
Eyes (%)	No. (%)	No. (%)	No. (%)	No. (%)
Iridencleisis 14 (100)	4 (28.6)	1 (7.2)	2 (14.3)	1 (7.2)
Scheie's operation 19 (100)	5 (26.1)	2 (10.5)	2 (10.5)	1 (5.2)
Cyclodialysis 8 (100)	4 (50.0)	-	1 (12.5)	3 (37.5)
Trabeculectomy 29 (100)	1 (3.4)	1 (3.4)	-	-
Total 70 (100)	14 (20.0)	4 (5.7)	5 (7.1)	5 (7.1)

None needed surgical management and got absorbed spontaneously with/without medical treatment.				
For Incidence of hyphaema $\chi^2 = 10.48$, $df = 3$, $P < .001$				

Table - 13 represents the incidence and absorption of hyphaema in respect of various procedures. The blood got absorbed by one day post-operatively in 4 eyes (iridencleisis-1, Scheie's-2, and trabeculectomy-1). It took more than 3 days to get absorbed in 5 eyes

(1 each in iridencleisis and Scheie's procedures and cyclodialysis - 3 eyes). However, none needed surgical management. The incidence (for different procedures) of hyphaema is highly significant statistically ($P \angle .001$).

TABLE - 14 : Delay in reformation of anterior chamber.

Operation	Day of A.C. Reformation			Total eyes
	1-3 days	3-5 days	7 5 days	
	No. (%)	No. (%)	No. (%)	No. (%)
Iridencleisis Eyes 14 (100)	1 (7.1)	5 (35.7)	2 (14.3)	8 (57.1)
Scheie's operation Eyes 19 (100)	2 (10.5)	4 (21.1)	5 (26.3)	11 (57.9)
Cyclodialysis Eyes 8 (100)	-	-	-	-
Trabeculectomy Eyes 29 (100)	9 (31.0)	-	-	9 (31.0)
Total	12 (17.1)	9 (12.8)	7 (10.0)	28 (40.0)

None needed surgical interference.

For total eye showing delayed anterior chamber formation,

$$\chi^2 = 3.99, \text{ df} = 1, P \angle .05$$

Similarly table - 14 represents the delay in the reformation of chamber. Total 28 eyes had a delay in the reformation of anterior chamber (iridencleisis - 8 eyes, Scheie's procedure - 11 eyes and trabeculectomy - 9 eyes). Anterior chamber was formed by operative 1-3 days in 12 eyes (1 of iridencleisis group, 2 of Scheie's group and 9 eyes which received trabeculectomy). The reformation was delayed by 3-5 days in 5 and 4 eyes of iridencleisis and Scheie's operation groups respectively. This reformation was further delayed to more than 5 days in the groups of eyes operated, by iridencleisis - 2 eyes; Scheie's - 5 eyes.

None of these eyes needed any surgical interference. However, the incidence of delay in reformation of chamber for these procedures is statistically significant ($P < .05$).

Table - 15 (following) reveals the incidence of hypotony at different follow-ups. Hypotony was noted in 28.5% eyes at 2 weeks post-operatively, highest were from the eyes operated by iridencleisis (57.1%) and the lowest number 3 eyes (10.3%) suffered hypotony for this period which were operated by trabeculectomy. The eyes went on improving the intra-ocular pressure and most of these crossed the line below which hypotony (10 mm.Hg.) was revealed. At 1 month 4 eyes each of those operated by iridencleisis and Scheie's procedure and 1 of

trabeculectomized eyes remained hypotonic. The hypotony was persistent in 3 eyes (2-iridencleisis group and 1 Scheie's group) at 3 months. Ultimately 1 eye each of these groups (7.1% - iridencleisis, 5.2% Scheie's operation) had intra ocular tension below 10 mm.Hg. at last follow-up (6 months).

TABLE - 15 : Post-operative hypotony.

Operation follow-up (X^2 , P)	Iriden- cleisis 14 eyes	Scheie's operation 19 eyes	Cyclo- dialysis 8 eyes	Trabecu- lectomy 29 eyes	Total 70 eyes
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
2 weeks ($X^2=4.91$, P $\angle .05$)	8 (57.1)	9 (47.3)	-	3 (10.3)	20 (28.5)
1 month ($X^2=1.38$, P $\angle .05$)	4 (28.5)	4 (21.0)	-	1 (3.4)	9 (12.8)
3 months ($X^2=0.78$, P $\angle .05$)	2 (14.2)	1 (5.2)	-	-	3 (4.2)
6 months ($X^2=0.20$, P $\angle .05$)	1 (7.1)	1 (5.2)	-	-	2 (3.3)

Hypotony - Intra-ocular pressure \angle 10 mm.Hg.

N.B. - The number of eyes, with no hypotony with one procedure, has been deleted from calculation of X^2 , df = 1, for all follow-ups.

TABLE - 16 : Other post-operative complication.

Operation	Iridenceleisis	Scheie's	Cyclodialysis	Trabeculectomy	Total
Complication	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Iritis $\chi^2=7.76$, $P < .01$	Mild	7 (36.8)	3 (37.5)	3 (10.3)	19 (27.2)
	Mod.	1 (5.3)	-	1 (3.4)	5 (7.1)
	- - - - -	-	-	-	-
*Progress in opacification of lens $\chi^2=9.37$, $P < .01$	Doubtful	7 (36.8)	Not applicable	3 (10.3)	16 (22.8)
	Definite	2 (10.5)	"	1 (3.4)	3 (4.3)
	- - - - -	-	-	-	-
Closure of surgical opening	6 (42.8)	9 (47.3)	"	4 (13.7)	19 (27.1)
	-	-	Closure of cleft at 6 months	-	2
	-	-	2 (25.0)	-	(2.8)
Endophthalmitis	-	-	-	-	-
Late infection	-	-	-	-	-

* Yates correction used while calculating the value of χ^2 .

Table - 16 (preceeding) shows the occurrence of complications, other than those previously described.

Iritis in post-operative period was the common feature (24 eyes, 34.3% eyes) in all the groups operated by various procedures. Nine eyes operated by iridencleisis suffered of mild (6) to moderate (3) iritis. Eight of the eyes operated by Scheie's procedure suffered of mild (7 - 36.8%) to moderate (1 - 5.3%) iritis, 3 eyes (37.5%) of cyclodialysis group suffered mild degree of iritis. However, the lowest percentage (13.7% - 4 eyes) of trabeculectomized eyes suffered mild to moderate iritis. These findings were highly significant statistically ($P \angle .01$). Table further reveals the progress in lens opacification in 19 eyes (27.1%) (6 eyes 42.8%) of iridencleisis group, Nine eyes (47.3%) of Scheie's group and 4 eyes (13.7%) of trabeculectomy group of patients, including those with doubtful progress in lens opacification). Progression in lens opacification following these procedures when compared, was highly significant statistically ($P \angle .01$). Two of the eyes operated by cyclodialysis did develop closure of surgical cleft at the follow-up. However, none developed endophthalmitis and late infection.

TABLE - 17 : Post-operative visual acuity of the eyes
at follow-up examination.

Operations	Iriden- cleisis	Scheie's operation	Cyclo- dialysis	Trabecu- lectomy	Total %
No. of eyes	14	19	8	29	70(100.0)
Doubtful PL	1	2	-	1	4 (5.9)
PL + (PR+/PR _±)	4 (3/1)	-	1 (1/0)	2 (1/1)	7 (10.0) (5/2)
H.M.	-	-	-	-	-
F.C. at 1'	-	1	1	-	2 (3.0)
6/60 or less	2	8	4	8	22 (31.0)
6/36 - 6/24	2	7	2	8	19 (27.0)
6/18 or more	5	1	-	10	16 (23.0)

PL - Perception of light, + = present, _± = doubtful,

PR - Projection of rays; H.M. = Hand movement,

F.C.= Finger counting.

TABLE - 18 : Post-operative changes in the visual acuity.

Changes in visual acuity	Iriden- cleisis	Scheie's	Cyclo- dialysis	Trabecu- lectomy	Total
	14	19	8	29	70
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Improved	3 (21.4)	4 (21.0)	1 (12.5)	6 (20.6)	14 (20.0)

No change	5 (35.7)	4 (21.0)	1 (12.5)	16 (55.1)	26 (37.0)

Loss of 2 lines of Snellen's test types	6/6 to 6/9	-	-	-	-
	6/12 to 6/18	2 (14.2)	5 (26.5)	1 (3.4)	8 (11.8)

Vision remained/lost to the level of no use	4 (28.5)	6 (31.5)	6 (75.0)	6 (20.6)	22 (31.0)

Tables 17 & 18 indicate the post-operative state of affairs regarding the visual functions of the organ. First of these (table - 17) represents the status of visual acuity retained post-operatively. Four of the eyes had doubtful perception to the light (1 each in iridencleisis and trabeculectomized groups and two from eyes operated by Scheie's procedure). However, a definite perception to light was the feature in 7 eyes.

(4 iridencleisis, 1 in cyclodialysis and 2 trabeculectomy). One each of the eyes operated by Scheie's procedure and cyclodialysis had finger counting at 1'. The visual acuity could be recorded by Snellen's test types in total 57 eyes. Twenty two eyes (2 in iridencleisis, 8 Scheie's, 4 cyclodialysed and 8 trabeculectomized) were having acuity of vision 6/60 or less, 18 eyes were having the acuity to the range of 6/36 - 6/24 (2 eyes each receiving iridencleisis and cyclodialysis, 7 eyes receiving Scheie's operation and 8 eyes trabeculectomy),

The acuity of vision remained in the range of 6/18 - 6/12 in only 16 eyes operated by iridencleisis (5 eyes), Scheie's (1eye) and trabeculectomy procedure (10 eyes). The preceeding table - 18 reveals the changes in the visual acuity following the surgical intervention. There was an improvement in acuity of vision in 14 eyes operated by various procedures; iridencleisis 3 eyes (21.4%), Scheie's procedure 4 eyes (21.0%), cyclodialysis 1 eye (12.5%), and 6 out of the eyes operated by trabeculectomy (20.6%). There occurred no change (to the original visual acuity) in 26 eyes. The loss of 2 lines on snellen's chart was observed in 8 eyes (2 iridencleisis, 5 Scheie's and 1 of trabeculectomized eyes).

TABLE - 19 : Post-operative status of visual field (central), at last follow-up.

OPERATION	Iridencleisis		Scheie's		Cyclodialysis		Trabeculectomy		Total	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
NORMAL	2	(3.03)	-	-	-	-	5	(7.75)	7	(10.6)
- - - - -	-	-	-	-	-	-	-	-	-	-
E.B.S.	2	(3.03)	2	(3.03)	1	(1.51)	6	(9.09)	11	(16.6)
- - - - -	-	-	-	-	-	-	-	-	-	-
B.B.S. + N.S.	4	(6.06)	4	(6.06)	1	(1.51)	5	(7.75)	14	(21.2)
- - - - -	-	-	-	-	-	-	-	-	-	-
ONLY TUBULAR VISUAL FIELD	-	-	1	(1.51)	3	(4.54)	-	-	4	(6.0)
- - - - -	-	-	-	-	-	-	-	-	-	-
NOT FEASIBLE	6	(9.09)	12	(18.18)	3	(4.54)	9	(13.6)	30	(45.4)
TOTAL NO. OF EYES	14		19		8		25		66	(100.0)

E.B.S. = Enlarged blind spot, B.B.S. = Haring of blind spot,

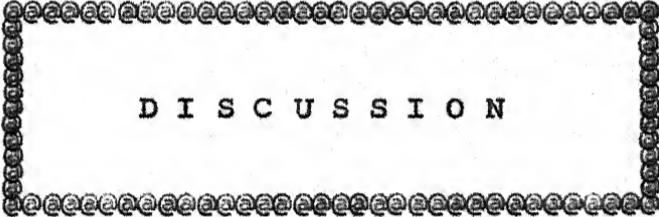
N.S. = Normal step and/or scotoma.

TABLE - 20 : Post-operative loss of the visual field.

	Iriden- cleisis	Scheie's	Cyclo- dialysis	Trabecu- lectomy	Total
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Field loss	1 (1.5)	1 (1.5)	2 (3.03)	2 (3.03)	6 (9.1)
Field loss despite controlled tension	-	-	1 (1.5)	1 (1.5)	2 (3.03)
No change	7 (10.66)	6 (9.1)	2 (3.03)	13 (19.7)	28 (42.4)

The preceeding tables 19 & 20 similarly represent the status of central field of vision after various operations, to elucidate the changes in it from the pre-operative status. It was not feasible to record the central field (table - 19) in 30 eyes. Seven eyes had normal central visual field (2 of them were operated by iridencleisis and rest 5 by trabeculectomy). Eleven eyes showed an enlargement of blind spot in their central fields (2 eyes which received iridencleisis, another two Scheie's operation, 1 cyclodialysis and 6 trabeculectomized). There was a baring of blind spot with scotoma and/or nasal step detected in 14 eyes (4 eyes each had iridencleisis and Scheie's procedures performed, 1 eye which was operated by cyclodialysis and another 5 were

from eyes which had trabeculectomy done for glaucoma). Four of the eyes had only tubular central field with large constriction (1 from Scheie's group and 3 from cyclodialysis group). The table - 20 represents only loss of visual field after operation. There was no change from previous status of central field in 28 eyes, however, six eyes which could not be relieved of the raised tension lost little or more of field operated by various procedures - iridencleisis (1 eye), Scheie's operation (1 eye), cyclodialysis and trabeculectomy (2 eyes each). Surprisingly 1 eye each, operated by cyclodialysis and trabeculectomy procedures, lost a little or more of their field of vision even when the tension was within physiological range throughout the follow-up.



DISCUSSION

DISCUSSION

The treatment of glaucoma in past have been in havoc, though constituting the mile stones in development of the present form of treatment. For last one-two decades there have been remarkable advances in the form of surgical treatment. The knowledge of histopathological causes, the introduction of trabeculectomy, and the laser application in the treatment are the revolutionary mile-stones. Yet the assessment of control (of glaucoma) in long run still remains a problem even after the celebrated entry of etiopathology based surgical approach; trabeculectomy. Moreover, age old surgical techniques like iridencliasis, Scheie's, cyclodialysis etc. are still used widely.

The present study have been undertaken with the view of observing long term effectiveness, surgical and post surgery complications, and minimum ocular disfigurement by the surgical procedures.

The series consisted of 61 patients of glaucoma, seventy eyes of these patients were subjected to any of the surgical procedures (iridencliasis,

Scheie's, operation, cyclodialysis and trabeculectomy with a distribution of 14, 19, 8 and 29 eyes respectively) irrespective of type of glaucoma.

Age and Sex :- In this study (Table - 1) the age of the patients varied from 30-91 years of age with a mean \pm S.D. = 51 ± 10.6 years, which is similar to previous studies; Scheie (1958); Sugar (1970); Pollack (1971); Bakker and Manku (1979) etc.

Anderson (1958), very rightly observed that incidence of glaucoma rises with each decade of life after 40 years.

The patients included in this study, were more from female community with a ratio of 1.4 females : 1.0 males. This is again coinciding with those in literature; Murphy and Spaeth (1974); Vishwanathan and Brown (1975); Bakker and Manku (1979); Singh et al (1981).

Type of glaucoma :- This series includes various types of glaucomas (Table - 2) acute congestive, 25.7%; chronic simple, 35.7%; chronic angle closure, 20.0%; combined mechanism, 4.5%; and aphakic, 14.3% eyes. These figures reflected that chronic simple glaucoma out numbered the other types. In literature the workers studied patients with specific type of glaucoma or a variety was included. Usually the patients presented themselves with an acute attack. In this study acute

glaucoma was second highest on the list (because many of the patients with an acute attack were first treated on medical lines or a broad iridectomy was performed, this led their exclusion from the study).

Intra-ocular pressure :- The eyes showed the intra ocular pressure (tension 35.5 ± 12.1 mm. Hg. at the pre-operative examination (table - 3). The pressure exhibited by the eyes subjected to various operations was, iridencleisis 37.7 ± 13.5 mm. Hg; Scheie's operation 35.9 ± 8.2 mm. Hg and trabeculectomy 33.7 ± 12.4 mm. Hg. These values of pre-operative intra-ocular pressure were quite comparable to those in the literature; Smith (1979); Dellaporta (1980); and many others.

This initially raised tension got down immediately after operation and settled finally (table 8 - Fig. 9) to various amounts by various procedures; iridencleisis (10.6 ± 2.19 mm. Hg); Scheie's operation (12.76 ± 2.99 mm. Hg.); Cyclodialysis (16.75 ± 3.92 mm. Hg.) and trabeculectomy (15.52 ± 2.4 mm. Hg.), similar to those in the literature, Cairns (1968); Thyer et al (1972); Dutta (1974-75); Jain et al (1980); Spaeth et al (1981); Bondeau et al (1981).

Control of intra-ocular pressure :- The controlled tension we levelled in a eye which had its intra-ocular pressure below 21 mm. Hg. (table - 7 & Fig. 8).

(a) Iridencleisis :- Iridencleisis was the procedure to which 14 eyes were subjected in this study. Out of these eyes

ten exhibited their intra ocular pressure below 21 mm. Hg. without any addition of antiglaucoma medication. Thus the successfully controlled tension was achieved in 71.4% cases. The results remained stable throughout the follow up (1-6 months). The border line cases which could only be controlled with added medication were excluded from successes. These results are well comparable to the previous reports. The popularity of iridencleisis, which it enjoys today is largely attributable to Holth(1930), who reported over all 85% successful results with iridencleisis, however, successful results without addition of antiglaucoma medication in follow up was just 50% (rest 35% cases were controlled other wise).

Successful results by iridencleisis procedure (unaided by medication in follow up) were reported in the range of 70-80% by many authors; Holst(1934), 75%; Gjessing(1939), 72.7%; Troutman(1955), 69.2%; Vannas and Tevajarvi (1964), 70%.

The literature also contains reports of higher success (more than 80%); Constantine(1937), 89%; Goar and Shultz(1939), 90%; Randolph and Robertson(1952), 85% in early case; Troutman(1954), 90% with two pillar iridencleisis; Scheie(1962), 83% ; Graham(1966), 83% ; and Patel and Bavishi(1981), achieved 96% success with iridencleisis. However, the authors didn't mention whether the controlled cases which needed antiglaucoma medication were included (or not).

At the same time reports with very low successful results after iridencleisis also find a place in the literatures; -Iliff(1944), 54.2%; Cassady(1958), 44% and 52% successful cases of iridenclisis out of Black and white populations; Berson et al(1969), reported only 20% successes with iridencleisis on Black population which, however, reduced to a very low rate(only 4%) of success on long term follow up.

(b) Scheie's operation :- 84.2% cases were successful with Scheie's operation. The intra ocular tension remained controlled in these eyes throughout the follow up (1-3 months), however, one eye of these just crossed the border line of controlled tension group because of scarring of bleb and thus at final follow up the successful results reduced to 78.9%. These results are very much in tune with the reports available in the records.

65-80% successful results with Scheie's operation, have been reported; Scheie(1959), 68.5%; Tyner et al(1960), 66.6%, Iliff and Haas(1962), 62%; Nadal(1966), 73.6%; Smith(1969), 75%; Vishwanathan and Brown(1975), 65.7%; Richards et al (1978), 66%; Bakker and Manku(1979), 74%; Shukla (1980), 79.3%; spaeth and Poryzees(1981), 75%; Bondeau and phelps (1981), 79.5%.

Success in more than 80% cases by Scheie's operation have also been reported; Malbran and Malbran (1959), 82% with a little modification in technique;

Scheie(1962), 87% in narrow and open angle glaucoma; Bounds(1964),87.6%; Poly Chronakos et al(1969),81.7%; Sollom et al(1969),85%; Saiduzzafar et al(1969),87.7%; Jain et al(1980), 96%. These reports, however, had no mention of those cases which were controlled with added post operative medication.

(c) Cyclodialysis :- Cyclodialysis was the procedure which was performed on aphakic(8) eyes. These cases had a drop in the intra ocular pressure definitely after surgery but the tension drop was not sufficient enough to mark it as success. Only 37.5% cases in this group of 8 eyes could be controlled. The literature contains varying successful results with cyclodialysis, fifty percent or less success rate were noted by; Hausman(1937), 44%; Troncoso(1940),20%; Mc pherson(1946),45%; Sugar(1947), 47.1% which after 6 years follow up reduced to only 38.6%; Kronfeld(1947), 50%; Alper(1966), only 17%; Molteno et al (1968), 14% success in secondary glaucoma cases; Kushwaha and Paul(1981), 31.5% successes only.

Success rates up to 65% without the use of implants had been reported by ; Haisten et al (1958),65%; Schultz (1960), 53.3%; Agrawal et al (1981), 65%.

High success rates up to 80% or more were also mentioned in the literature with various modifications like the use of implants to keep the passage patent, but we didn't use any implants.

The success we achieved by Cyclodialysis though comparable to many of the previous reports yet we consider

it a low success than expected. The percentage of successful results would have been better if the number of cases included would have been sizeable and the cases controlled with post operative antiglaucoma medication would have been added to.

(d) Trabeculectomy :- Trabeculectomy yielded best results in this series. 93.1% eyes exhibited controlled intra ocular pressure throughout, however, the success rate mathematically got down by 1.1%(i.e. 92% success) at 6 months when four of the cases could not be followed up. The literature contains enormous studies on trabeculectomy with varying successful results. Cairns (1968) who introduced trabeculectomy and treated his cases to get 100% success similiary, Danheim and Harms (1969), 80%, Chatterjee and Ansari (1972), 75% in Black population; Thyer and Wilson(1972), 86.3%, Ridgway(1972), 93%, in primary glaucoma cases and 68.2% in other glaucomas; Mehta et al (1974), 85.9%, Jerndal and Kriisa(1974), 100%, Ridgway(1974), 84.5%, Shwartz(1974), 74%, Dutta(1974-75), 87.5%. In the same way 80% success rates were acheived by Freedman et al (1976), Wilson(1977), Portney(1977), Zaidi(1980), Mills(1981) in Chronic angle closure glaucoma; Bondeau and phelps(1981) and others. However, more than 90% successful results were reported by Galin(1975), Watson et al (1975), Anderson(1976), Watkins(1978), Mital et al (1979), Maria et al (1980), Jay et al (1980), Jain et al (1980), Robert David(1981), Patel et al(1981), Natrajan et al (1982), Hasan and Hasan(1982) and others.

Operative Complications :-

In this series of cases operated by four different (iridencleisis, Scheie's, cyclodialysis and trabeculectomy) procedures some complication were seen during the operation (Table - 6). There was button holing of conjunctiva during Scheie's operation and trabeculectomy, 1 eye each (5.3% and 3.4% respectively); and 1 eye (3.4%) which was being operated by trabeculectomy had an accidental scleral (superficial) flap tearing. The previous studies contains the reports of this complication.

Nadel (1966), 2%; Freedman et al (1979), faced it as most common and serious operative complication; Shwartz and Anderson (1974) in, out of 16 aphakic eyes subjected to trabeculectomy - 2 eyes (12.5%); Thommy and Bhar (1979), 1 eye (0.9%); Bondeau and Phelps (1981) reported conjunctival button holing in 2.1% during trabeculectomies and during Schieie's procedure in 8% eyes. Scleral flap tearing was reported very scantily, Hasan and Hasan (1982) reported scleral flap tearing in 3 eyes (2.3%).

Blood was there in the anterior chamber in 14 (20%) eyes (4 iridencleisis, 5 Scheie's, 4 cyclodialysis and 1 of trabeculectomy group). The literature had only a few reports with blood in anterior chamber as operative complication. Probably many of the authors

included it in early post-operative complications under hyphaema. The following reported varying percentages of cases having presence of blood (at operation table), in the anterior chamber.

Haisten and Guyton (1958), 72% cases with blood in the series of cyclodialysis; Shwartz and Anderson (1974), 6.25%; Zaidi (1980), 53% cases; Spaeth and Poryzees (1981) reported much blood in 13.3% cases of trabeculectomy and in 20% cases of Scheie's operation.

In this study one aphakic eye in which trabeculectomy was being done, had a vitreous disturbance in the form of plugging. Vitreous disturbance had been quite a frequent occurrence during glaucoma surgery as evident from various reports. Haisten and Guyton (1958), 5% cases of cyclodialysis; Nadel (1966), 2% cases of Scheie's operation; Shwartz and Anderson (1974), 2.5% adult aphakic eyes during trabeculectomy; Bakker and Manku (1979), 3 (3.2%) eyes; Singh et al (1981), 3 eyes during trabeculectomy.

These observations are quite comparable to the previous reports. In one eye, however, while iridencleisis was being done on it had an accidental injury to lens itself.

Visual acuity (Table - 4, 17 & 18) :-

The visual acuity was ranging from doubtful perception of light to 6/18 or better at pre-operative examination. Out of total 70 (100%) eyes, only 37.1% had an useful vision (6/36 or better), ranging from 6/36 to 6/24 (17 eyes, 24.3%) to 6/18 or better (9 eyes, 12.8%). However, rest of the eyes (62.9%) had no useful vision - ranging from doubtful perception of light (2 eyes, 2.8%) to 6/60 or less on Snellen's test chart (11 eyes - 15.9%). After operations, however, useful visual acuity was found to be present in 50% eyes - ranging from 6/36 - 6/24 (19 eyes - 27.0%) to 6/18 or better (16 eyes - 23.0%). The other group of patients with no useful vision was having a range from doubtful perception of light (4 eyes - 5.9%) to 6/60 or less (22 eyes - 31.0%).

Thus the vision was stationary in 26 (37.0%) eyes or improved (14 eyes - 20%). The loss of visual acuity by two lines of Snellen's test chart was noticed in 8 (11.8%) eyes, however, 22 (31%) eyes were having no useful vision following the loss. The loss of visual acuity after surgical treatment for glaucoma had been reported by a good number of workers; (in percentage of eyes), Holst (1934), 12%; Gjessing (1939), 18%; Scheie (1963), 36%; Smith (1969), 14% by trabeculectomy and 17.4% by filtering surgery; Jern-dal et al (1974), 45.4%; Dutta (1974-75), 37.5%; Bakker et al (1979), 20% by

Scheie's operation and 13% by trabeculectomy; Mills (1981), 45.2% in trabeculectomized eyes. The present findings of loss of visual acuity are quite in tune with those reported in past.

Visual field (Table - 5, 19 & 20) :-

The visual field was found ranging from normal to tubular field at pre-operative check-up (normal field, 11 eyes - 15.7%); with enlarged blind spot, 12 eyes - 17.1%; with baring of blind spot and/or nasal step/scotoma; 16 eyes - 22.8%; tubular field of vision 3 eyes - 4.2%). It was not feasible to record the central visual field at pre-operative check-up in 28 (40%) eyes as also at post-operative examination in 30 (45.4%) eyes, either because of poor visual acuity or due to non-cooperative attitude of the patients.

A further loss in the visual field was noted after operation in total 8 (12.1%) eyes. Two (3%) of these 8 eyes which were operated (one each) by cyclodialysis and trabeculectomy experienced a further loss of field, inspite of the controlled tension throughout the follow-up. The previous studies mentioned further loss of field of vision (in various percentages of eyes). Holst (1934), 12%; Gjessing (1939), 18%; Werner et al (1977), 21.4%; Spaeth et al (1981), 6 cases of field loss of which 5 were having a controlled tension.

Many other workers reported a further field loss after operation without a mention of the control in tension. Goar and Schults (1939), 11%; Riise (1958), 7% further loss in initial 'no field loss' group and all field lost in other group; Haisten & Guyton (1959), 9%; Schultz et al (1960), 63.4%; Dalglish and Naylor (1965), 53% and 35% in open and closed angle glaucoma; Jerndal et al (1974), 28%; Bondeau et al (1981), 28% eyes.

The formation of filtering bleb :-

Filtering blebs were observed in each operation group except cyclodialysis (Table - 12). The cases which were subjected to iridencleisis, Scheie's operation and trabeculectomy exhibited blebs in 84.7%, 84.2% and 82.7% cases respectively. Bleb formation is the key to success and an inherent characteristic of the former two procedures. The Bleb formation after trabeculectomy had been disputed basically, though reported by many workers in good percentages even by Cairns himself. Cairns (1968), 30%; Cairns (1969), 50%; Thyer and Wilson (1972), 72.4%; Mehta et al (1974) diffused blebs, 64%; Watson et al (1975), 100%; Maria et al (1980), 100% (64.4% diffused); Jain et al (1980), 100% blebs; Bondeau and Poryzees (1981), 71.4%.

Our cases of trabeculectomy showed 82.7% (72.4% diffused) blebs, a finding consistent with previous reports.

Post-operative complications :-

(a) Hyphaema : (Table - 13) :- This happened to be the most common post-operative complication to be present in 20.0% cases, however, the hyphaema was absorbed in most of the cases by 1-3 days. The cases which exhibited hyphaema for more than 3 days were 7.1% iridencleisis cases, 5.2% in Scheie's group, 37.5% cyclodialysis. There remained no hyphaema after 3 days in trabeculectomy. The filtering procedures enjoy the hyphaema as an early post-operative complication which had been reported in the literature; Scheie (1959), 8.5%; Tyner et al (1960), 16.8%; Scheie (1962), 10.4%; Nadel (1966), 13.6%; Richards et al (1978), 29.4% eyes (absorbed by 3 days); as by Spaeth et al (1981), 12%; Bondeau et al (1981), 48% cases exhibited hyphaema.

By trabeculectomy in past, the hyphaema had been reported to be absorbed by 3 days, however, the reports of hyphaema present for more than 3 days were too noticed; Cairns (1968), minimal hyphaema in all his cases; Ridgway (1972), 15% eyes for 1-3 days; Ridgway (1974), 11 eyes; Watson (1975), 19% for two days; Portney et al (1977), 30% in primary glaucoma; Watkins et al (1978), 4.3%; Mital et al (1979), 3.5%; Maria et al (1980), 8.9%.

(b) Delay in reformation of anterior chamber :-

We observed in this series (Table - 14) that in 50% cases the chamber reformed by more than 3 days

with iridencleisis, by Scheie's operation it delayed by more than 3 days in 47.4% and in no case of cyclodialysis and trabeculectomy. The literature had number of reports with delay in chamber formation by 3-5 days. With iridencleisis and Scheie's procedure; Scheie (1962), 43.3%; Massin and Hudelo (1963) found a delay in anterior chamber formation as an usual incidence; Allen (1962), 38.3% after filtering procedures; Madel (1966) 25.4% in cases which received Scheie's operation; Berson et al (1969), found delayed anterior chamber formation after filtering surgical procedure in 41% cases; Vishwanathan and Brown (1975), 58% cases after Scheie's operation, similarly, Richards et al (1978) observed flat/shallow anterior chamber in 52.5% cases.

(c) Hypotony :-

Hypotony was observed (Table - 15) over all 28.5% eyes till 2 weeks after operation (57.1% iridencleisis, 47.3% cases of Scheie's group and 10.3% of trabeculectomy group). However, on follow-up one case each of iridencleisis and Scheie's group were hypotonic constituting a total 3.3%. Hypotony after surgical procedures had been given a place in the literature (without a mention of the post surgical duration at which the observation was made) ranging from 4% to more than 50% cases; Scheie (1959), 21.4%;

Tyner et al (1960) and Scheie (1962), 7.4%; Bounds (1964), 4%; Sugar (1962), 18%; Nadel (1966), 8.6%; Bondeau and Poryzees (1981), 40%.

Though no case of trabeculectomy remained hypotonic by the last follow-up in this study but by one month, which too gained the pressure. Dutta (1974-75) reported incidence of hypotony at 4 weeks in 33.3% eyes later on at 3 and 6 months only 12.5% cases remained hypotonic; Watson et al (1975), 3.3%; Mital et al (1979), 21.4%; Natrajan et al (1982), 15%.

(d) Iritis :-

Mild to moderate iritis was again an important complication (Table - 16) seen post surgically in 24 eyes (34.3%) in this study with a distribution of 64.2% iridencleisis cases, 42.1% Scheie's group, 37.5% of cyclodialysis group and 13.7% of the cases operated by trabeculectomy. The iritis was observed by various workers after fistulizing operations in past; Nadel (1966), 2.7% cases; Berson et al (1969), observed a mild iritis in all their cases; Polychronakos (1970), in 58.3% cases of Scheie's operation; Shukla and Thakur (1981), 50% cases of iritis after cyclodialysis; Natrajan et al (1982), only 20% cases of iritis. Similarly iritis was reported after trabeculectomy; one out of the 17 (5.8%) cases by Cairns (1968); Dutta (1974-75), 12.5%; Watson et al (1975), 14.4%; Maria et al (1980), 6.6%.

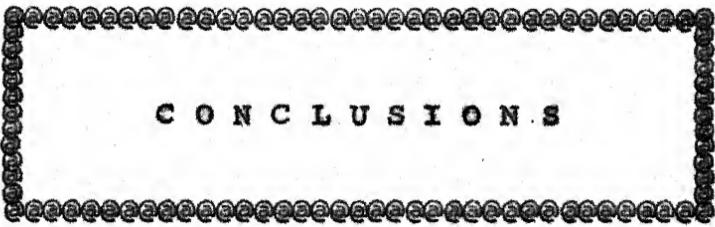
(e) Progression in lens opacification :-

Lenticular opacification was observed (Table - 16) in 27.1% cases in this study, however in majority (20% cases) the changes were doubtful. The lenticular opacification has been observed in each group, 42.8%, 47.3% in iridencleisis and Scheie's group respectively, however, 13.7% cases of trabeculectomy were also having some progression in opacification of lens.

This had been the most talked about complication in the literature, the formation of cataract in 13% to more than 50% following iridencleisis had been observed by many; Fanta (1948), 17%; Christiansson (1967), 52.5%. Similarly after Scheie's operation; Sugar (1962), 18%; Allen (1966), 32%, Sugar (1970) observed 58% cataracts following filtering operation. The cataract development after trabeculectomy was described in past by; Jern-dal and Kriisa (1974), 22.7%; Chauvad et al (1978), 28%; Jain et al (1980), 7.2%; Zaidi (1980), 9.8%.

The complications in this series were too little and well consistent with those described in the literature.

With the above text it is reflected that although the classical filtering surgical procedures and cyclodialysis have got considerable rates of success yet trabeculectomy remains the best in all terms.



C O N C L U S I O N S

CONCLUSIONS

In the light of the present work and with a view of studies in past from the literature the following can be concluded;

1. Glaucoma affected usually after 3rd decade of life and commonly between 46-50 years ($M \pm S.D. = 51 \pm 10.6$ years of age).
2. It affected both the sexes, females out numbered the males with a ratio of 1.4 : 1.0.
3. All the patients reported only after a considerable loss of visual acuity, acuity status ranging from 6/18 or better to as low as doubtful perception of light. Most of the patients (62.9%) had no useful vision.
4. Only 60% of the patients could be subjected to visual field examination of which 15.8% were having the field within normal limits and rest of them had a varying amount of field defects.
5. Trabeculectomy produced best results - 93.1 - 92% (highly significant $P < .01$ at all the follow-ups), second highest results were with thermosclerostomy

with peripheral iridectomy (Scheie's operation)
84.2 - 78.9% successful.

6. Similarly, the operative complications were least with trabeculectomy (total 13.7%) followed by Scheie's operation (31.6%).
7. Post-operative complications - early as well as late were minimal with trabeculectomy followed by Scheie's operation, iridencleisis and cyclodialysis showing a clear-cut high rate.
8. The visual acuity was deteriorated after operation of each type, least again in cases operated with trabeculectomy (25% cases) followed by (42.7%) iridencleisis, (58%) Scheie's operation, and maximum (75%) with cyclodialysis.
9. Similarly, a little or more of field of vision was deteriorated with each operation, in 1.5% with iridencleisis and Scheie's operation each followed by 4.5% cases of trabeculectomy and cyclodialysis. However, in 45.4% eyes (including all groups), it was not feasible to record the field of vision.
10. There was a definite fall in the intra-ocular pressure by each operation though the amount of drop in tension was insignificant post-operatively but at 6 months cyclodialysis produced less (statistically

significant) fall in the pressure in comparison to other operations.

11. The most important post-operative complication remains progression in lens opacification in 13.7% eyes operated by trabeculectomy followed by iridencleisis 42.8%, and Scheie's 47.3% eyes. This observation is again statistically highly significant ($P \leq .01$).

Thus trabeculectomy (done without operating microscope) remains the best procedure when compared with, classical filtering operations - Scheie's and iridencleisis, and cyclodialysis.



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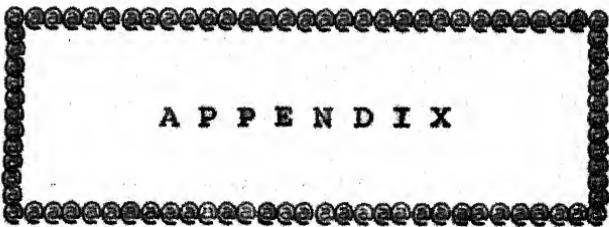
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APPENDIX

APPENDIXPROFORMA FOR EXAMINATION

CASE No.	<u>Details of Patient</u>
1. Name of investigator:	1. Name
2. Surgeon I/C	2. Age/Sex Wd/Bed
3. <u>Place</u> :- Medical College Hospital, Jhansi (Dept. of Ophthalmology)	3. Address
4. Date :	4. Occupation
	5. Socio-economic status
	6. In habit of taking any intoxicant.

A. PRESENTING SYMPTOMS :

(a) Head ache :- Sided

Rt.

Lt.

Severity - Only heaviness/Mild/Moderate/
Severe

Hours of severity

Associated with vomiting : Yes/No

(b) Pain in Eye

:

Yes / No

Severity

(c) Redness of Eye

:

(d) Diminution of vision :

(e) Any other symptom

:

B. A brief H/o present illness :PAST HISTORY :-1. History pertaining to previous attack of same type, if any
and treatment - nature if taken.

2. H/o Hypertension

3. Diabetes

FAMILY HISTORY :-

Any history regarding same type of disease.

CLINICAL EXAMINATION :

1. Body built
2. Pulse
3. B.P.

SYSTEMIC EXAMINATION :

1. Cardiovascular system
2. Respiratory system
3. C.N.S.
4. Skin & V.D.

LOCAL EXAMINATION :

1. Facial symmetry
2. Eye Brows Rt. Lt.
3. Eye lashes
4. Eye lids
5. Conjunctiva - Bulbar
 - Limbal
 - Palpebral
 - Intermarginal strip
6. Cornea
 - Size
 - Shape
 - Surface
 - Curvature
 - Lustre
 - Transparency
 - Sensitivity

7. Anterior chamber -

- (i) Depth Normal/Shallow/Deep
 (ii) Contents - Colour
 - Nature
 - Flare (if any)

8. Iris

- Colour
 Surface
 Pattern
 Atrophy, if any

9. Pupil

- Size
 Shape
 Colour
 Reaction to light
 - Direct
 - (Consensual)

10. Lens

- Position
 Transparency
 Any other finding

11. Visual acuity : Rt. Lt.

12. Digital tension: Rt. Lt.

13. Tonometry : ~~Snellen~~ Rt. Lt.
 Applanation Rt. Lt.

14. Fundoscopy : Rt. Lt.

15. Gonioscopy : Rt. Lt.

16. Perimetry : Rt. Lt.

17. Diagnosis:

Complications during operation:

Type	Rupture of lens	Vitreous prolapse/loss	Hypphaema	Iris injury

FOLLOW-UP CHART

CASE No. _____

Patients Name :

Diagnosis - Eye (Rt./Lt.)

Operation performed with date :

Date of Exam.	Ocular Sch.		Tension Appla.		Fundus Disc. Cupping		Visual acuity		Peri-metry		Scoto-metry		Size & thickness		Post-operative complications - Hyphaema, Day of A/C formation, infection, iritis, strabismic keratitis
	Rt.	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.	Lt.	

1. Pre-Op.

2. Post Op.
1 wk.

3. 11 wk.
at discharge

4. 1-1/2 month

5. 3 months

6. 6 months.